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THE STAPELIEAE

BY

ALAIN WHITE AND BOYD L SLOANE

IN COLLABORATION WITH

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MISS I. C. VERDOORN, Botanical Section, Division of Plant Industry, Pretoria, South Africa;
DR. E. WERDERMANN, Botanisches Museum, Berlin-Dahlem, Germany;
THE WILD PLANT SOCIETY OF MATABELELAND, Bulawayo, Southern Rhodesia.

VOLUME I

PASADENA, CALIFORNIA

1937



PLATE I.

Stapelia—"Dewy, Hirsute, Bell-shaped."

From aquatint drawn by Henderson, published by Dr. Thornton, Jan. 181

THIS FIRST VOLUME OF
THE SECOND EDITION OF
THE STAPELIEAE PRINTED
IN FEBRUARY,
1937

TYPOGRAPHY AND PRINTING
BY SCOTT E. HASELTON AT
ABBAY SAN ENCINO PRESS

PREFACE

IN UNDERTAKING a second edition of *THE STAPELIEAE*, we have been prompted by the warm reception accorded to the first and by a desire to bring together the formal descriptions of the plants of this tribe of *ASCLEPIADACEAE*, with keys to the genera and some additional illustrations.

Our efforts to collect the necessary materials have met with such a widespread and hearty response, that the new edition has outrun the scope of our original plan. The final form of the book is due to the collaborators, who have helped us with so much enthusiasm and who have imparted to these pages whatever vitality they may possess. The responsibility, however, for all opinions expressed and for the translations of the formal descriptions from foreign languages, rests with us. Where not otherwise stated, the figures of plants are from photographs by the junior author.

The list of our collaborators is a long one. We would have wished to include the names of all on our title page, for each and all they constitute the true authors of the book; but we can at least here express to all our very hearty acknowledgments for their help, in addition to the acknowledgments made in the Preface of the first edition:

To DR. I. B. POLE EVANS, C.M.G., Chief of the Division of Plant Industry, Department of Agriculture and Forestry, Pretoria, South Africa, for the loan of some of the original plates which appeared in *The Flowering Plants of South Africa*, and for permission to reproduce these; and for permission to reproduce his *Vegetation Map* from the *Official Year Book of the Union of South Africa*;

To the following members of the staff of the Botanical Section of the Division of Plant Industry, Pretoria, for great assistance at every step in the collection and preparation of our materials: DR. E. P. PHILLIPS, MISS I. C. VERDOORN, DR. H. G. SCHWEICKERDT, MR. R. A. DYER, MISS M. D. GUNN, MISS C. LETTY;

To MR. CARL LUCKHOFF, Capetown, South Africa, for his constant and invaluable help in the study of the species and their distribution, and in the preparation of the keys, for descriptions of new species, for gifts of plants and a large collection of his beautiful photographs, and for permission to reproduce a number of his original water color plates;

To MISS A. A. OBERMEIJER, Botanical Assistant, the Transvaal Museum, Pretoria, for very generous and valued help in the classification of species, for gifts of plants and the descriptions of new species; and to DR. R. BROOM for original drawings;

To DR. G. C. NEL, Professor of Botany at the University of Stellenbosch, Stellenbosch, South Africa, and MR. H. HERRE, Curator of the Botanic Garden of the University, for constant assistance in many lines, including the descriptions of new species, geographical notes, many splendid gifts of plants, and a wide selection of original photographs and permission to reproduce published photographs from *Kakteenkunde* and the *Kakteen Jahrbuch*;

To MRS. L. H. M. BOLUS, Director, and MR. N. S. PILLANS, the Bolus Herbarium, Kirstenbosch, South Africa, for much botanical and historical information, and for photographs and the descriptions of new species;

To DR. F. H. GRAVELY, Superintendent, and MR. P. V. MAYURANATHAN, Botanical Assistant, the Madras Government Museum, Madras, India, for gifts of plants and photographs, for much information regarding the Indian species, and for permission to reproduce the plates from the *Bulletin of the Museum on the Indian Species of Caralluma*;

To SIR ARTHUR W. HILL, Director, The Royal Botanic Gardens, Kew, England, for helpful

assistance in many matters, including a gift of plants and permission to reproduce drawings from the Kew Herbarium; and to MISS STELLA ROSS-CRAIG, The Herbarium, for a series of very interesting original drawings;

To THE BENTHAM TRUSTEES, Kew, for permission to reproduce original drawings, and plates from Hooker's *Icones Plantarum*;

To MESSRS. L. REEVE AND CO., LTD., Ashford, Kent, England, for permission generously given to quote all the descriptions of species by Dr. N. E. Brown from the *Flora of Tropical Africa*, 1904, and the *Flora Capensis*, 1909, and for very helpful cooperation in the matter of our reproducing plates from the *Flowering Plants of South Africa*;

To the Director of the South African Museum, Capetown, and MISS S. JARABEDIAN, Senior Botanist, for extending facilities for the study of manuscript works in the Library of the Museum; and to DR. J. LUCKHOFF, Capetown, for assistance in examining these manuscripts;

To DR. E. WERDERMANN, Director of the Berlin-Dahlem Botanical Museum and Garden, Berlin-Dahlem, Germany, for photographs of plants in the Herbarium of the Museum, for permission to reproduce a plate from *Blühende Kakteen*, and for much general assistance;

To MR. HERBERT LANG, Pretoria, for permission to reproduce a selection from his admirable collection of plant photographs;

To MR. G. W. REYNOLDS, Johannesburg, South Africa, for a large collection of excellent photographs and much information regarding the plants represented in them;

To MR. S. TAPSCOTT, Nkana Mine, Northern Rhodesia, for a collection of his beautiful photographs, now in the Bolus Herbarium, Kirstenbosch, and for information regarding the distribution of species;

To MR. DAVID PRINGLE, Port Elizabeth, South Africa, for gifts of plants and photographs, and constant general assistance;

To DR. LEON CROIZAT, New York, U. S. A., for great assistance in research;

To MR. LADISLAUS CUTAK, in charge of Succulents, The Missouri Botanical Gardens, St. Louis, U. S. A., for constant help in research and for photographs of figures from works in the Library of the Botanical Gardens;

To CAPTAIN AMBROSE E. A. DUNSTON, Donhead St. Mary, England, for much help in research;

To PROFESSOR R. H. COMPTON, Director, The National Botanic Gardens, Kirstenbosch, for a selection of his photographs, and for seeds and general information;

To MISS M. WILMAN, The McGregor Museum, Kimberley, South Africa, for valuable information on the distribution of species in Griqualand West, and for permission to reproduce a plate from *The Rock Engravings of Griqualand West and Bechuanaland*, 1933;

To MR. C. D. B. LIEBENBERG, Botanist in Charge, and MISS G. V. BRITTEN, Assistant Botanist, The Albany Museum, Grahamstown, South Africa, for copies of drawings by Mrs. F. W. Barber, and for data on the distribution of local species;

To PROFESSOR KURT DINTER, Bautzen, Germany, for general information regarding the species in South West Africa, and for gifts of photographs and herbarium sheets, and permission to reproduce plates from *Neue Pflanzen Deutsch-Südwest-Afrikas*, 1914;

To PROFESSOR AUG. CHEVALIER, Director, and MR. JEAN TROCHAIN, Assistant, the National Museum of Natural History, Paris, France, for information regarding species from the countries surrounding the Sahara, with specimens in liquid, and for permission to reprint a photograph from the *Comptes Rendus de l'Acad. des Sciences Colon.*;

To PROFESSOR R. MAIRE, Director of the Botanical Department of the University of Algiers, Algeria, for much information regarding the North African species, and for gifts of books;

P R E F A C E

TO PROFESSOR P. CHOUX, Faculté des Sciences, Marseille, France, and MR. RAYMOND DECARY, Provincial Commissioner of Madagascar, for information on the interesting species from Madagascar, and to Prof. Choux for permission to reproduce photographs from the *Annales du Mus. Colon. de Marseille*;

TO PROFESSOR EMILIO CHIOVENDA, Director of the Botanical Institute of Bologna University, Bologna, Italy, for original drawings and great assistance regarding the species from Somaliland, and for permission to reprint plates from *Flora Somala*;

TO MR. JOHN GOSSWEILER, Luanda, Angola, for gifts of plants and information about the species in Angola, and the description of a new species;

TO PROFESSOR ANTONIO DE FIGUEIREDO GOMES E SOUSA, Inhambane, Portuguese East Africa, for gifts of plants, original drawings and information regarding the species from Portuguese East Africa;

TO DR. V. G. L. VAN SOMMEREN, Curator, and MRS. E. R. MOLONY, formerly Botanist of the Coryndon Memorial Museum, Nairobi, Kenya, and to the members of the East Africa and Uganda Natural History Society, Nairobi, for gifts of plants and much information about the species in Kenya;

TO DR. GEORGE ARNOLD, Director, the Rhodesian Museum, Bulawayo, Southern Rhodesia, for original drawings of the Rhodesian species;

TO CAPTAIN R. H. R. STEVENSON and MR. F. W. PORTER, the Wild Plant Society of Matabeleland, Bulawayo, for gifts of plants and information on Rhodesian species;

TO MR. E. R. FULLER, President, the Prieska Plant Protective Society, Prieska, South Africa, for information on the distribution of local species and a valued invoice of plants;

TO MRS. D. VAN DER BIJL, MRS. M. M. HELM, MRS. ALFRED SEARLE and MRS. W. FRANKLIN, the South African Succulents Society, Great Brak River, South Africa, for gifts of plants;

TO MR. RAY H. N. SMITHERS, Wynberg, South Africa, for his gifts of plants and photographs;

TO MR. B. LEVY, Wankie, Southern Rhodesia, for a gift of plants and valuable notes regarding Rhodesian species;

TO DR. E. E. GALPIN, Naboomspruit, South Africa, for a gift of plants and an important series of notes on the distribution of the Transvaal species;

TO MR. L. S. A. VEREKER, Salisbury, Southern Rhodesia, for gifts of plants and photographs, and information regarding the Rhodesian species;

TO MR. J. F. KIRSTEN, Pietersburg, South Africa, for gifts of books and maps, and much information about the species in the Transvaal;

TO DR. T. N. LESLIE, Vereeniging, South Africa, for a selection of his photographs;

TO MR. R. J. DARVALL, Atbara, Anglo-Egyptian Sudan, for gifts of plants, photographs and notes on the distribution of species in the Sudan;

TO COLONEL RALPH EVELYN DRAKE-BROCKMAN, Worthing, England, for assistance regarding the plant geography of Somaliland;

TO MR. J. C. J. KNOBEL, Zeerust, South Africa, for information regarding the species in the western Transvaal and the Bechuanaland Protectorate, and MR. J. C. KNOBEL, Molepolole, Bechuanaland Protectorate, for a gift of seeds;

TO DR. J. MUIR, Riversdale, South Africa, for photographs and much assistance in research;

TO MR. W. ARMSTRONG VAN RYNEVELD, Somerset East, South Africa, for a welcome gift of plants, and information regarding local species;

TO MR. W. TRIEBNER, Windhoek, South West Africa, for gifts of plants, a large collection of photographs and general information about the South West African species;

TO COMM. DOTT. ISAJA BALDRATI, Asmara, for data on the distribution of species in Eritrea;

P R E F A C E

To DR. C. M. SCHAFFTER, Isfahan, Iran, for assistance in endeavoring to locate the presence of *Carallumas* in Iran;

To MR. E. B. W. SCHOENFELDER, Grootfontein, South West Africa, for a gift of plants and valuable photographs of species in South West Africa;

To DR. A. EIG, Director of the Faculty of Botany, the Hebrew University, Jerusalem, Palestine, for a gift of plants;

To LADY MURIEL JEX-BLAKE, Nairobi, for beautiful photographs taken by her husband, DR. A. J. JEX-BLAKE;

To MAJOR E. J. LUGARD and MRS. LUGARD, Abinger Common, England, for permission to reproduce an original water color drawing by Mrs. Lugard, and for much valued assistance regarding the species of Tropical Africa;

To COLONEL M. T. BOSCAWEN, Tanga, Tanganyika, for information on the local species;

To MR. ERNST RUSCH, Windhoek, for gifts of plants and general information about South West African species, and a collection of photographs by MR. ERNST RUSCH, JR.;

To MRS. D. R. TWEEDIE, Kitale, Kenya, for a gift of plants and an original water color drawing

To MR. H. W. JAMES, Cradock, South Africa, for information regarding local species;

To MISS EDITH L. STEPHENS, the Botanical Department, University of Capetown, Rondebosch, South Africa, for assistance with the biographical notes;

To MR. PETER R. O. BALLY, Moshi, Tanganyika, for photographs and general information on the local species;

To MR. F. R. LONG, Superintendent of Parks, Port Elizabeth, for gifts of plants and general information;

To MR. A. P. D. MCLEAN, Mycologist in Charge, the Natal Herbarium, Durban, Natal, and MISS HELEN FORBES, in charge of the Herbarium, for information on the distribution of Natal species;

To MR. K. BISWAS, Curator of the Herbarium, Calcutta Botanic Gardens, Calcutta, India, for general information;

To MR. C. A. SMITH, Pietermaritzburg, Natal, for important historical information and photographs;

To MISS G. CLARKSON, Salisbury, Southern Rhodesia, for a gift of plants;

To MR. C. DE MELO VIEIRA, Acting Director, the Department of Agriculture of Portuguese East Africa, Lourenço Marques, Portuguese East Africa, for a gift of plants and publications;

To MRS. ETHEL ANDERSON, Grahamstown, for a list of species from Griqualand West;

To MR. J. GATTEFOSSE, Aïn-Seba, French Morocco, for a set of photographs taken by the Baruel-Gattefossé Expedition in French Morocco;

To MR. REDMOND ORPEN, Kleinsee, South Africa, for interesting general notes;

To PROFESSOR F. DOUMERGUE, Conservator of the Municipal Demaeght Museum, Oran, Algeria; MR. A. FAURE, Oran; DR. A. CUENOD, Tunis, Tunisia; DR. L. EMBERGER, Rabat, French Morocco; and MR. R. PRIMOS and MR. H. J. FORRESTER, Capetown, for gifts of plants;

To MME. B. DE CHANCEL, Bougie, Algeria; PROFESSOR R. E. MASSEY, Khartoum, Anglo-Egyptian Sudan; MR. T. BERGER, Haruchas, South West Africa; MR. G. G. SMITH, Cambridge, South Africa; MR. H. B. SHARPE, Rumuruti, Kenya; and MR. J. M. VAN DER HOUTEN, Rotterdam, Holland, for gifts of seeds;

To MR. F. WIEDEMANN, Erfurt, Germany, for gifts of plants, photographs and periodicals;

To MR. E. JAHANDIEZ, Carqueiranne, France, for gifts of plants and permission to reproduce one of his drawings;

P R E F A C E

To W. KESSELRING, Inspector of the Botanical Garden of the Technical Highschool, Darmstadt, Germany, for gifts of plants;

To THE EARL OF POWIS, London, England, for a photograph of Sir Joshua Reynolds' portrait of Lady Clive, and the ARUNDEL SOCIETY, London, for permission to reproduce the same;

To DR. M. NIEMEIJER, Wassenaar, Holland, for the gift of an original album-page of Justus Heurnius, and for much historical information regarding the early botanists in Holland;

To MISS EDITH E. BROWN, Kew, for a portrait of her grandfather, Thomas Cooper;

To MRS. GEORGINA I. LISTER, for information regarding her father, Thomas C. Bain;

To PROFESSOR A. BEGUINOT, Director, the Hanbury Botanic Institute, Genoa, Italy, for biographical information about Prof. O. Penzig; and to MRS. ADELE GHEZA-PENZIG, Breno, Italy, for a portrait of Prof. Penzig, her father;

To THE DIRECTOR of the Botanical Institute of Padua, Italy, for a portrait of Dr. D. Riva;

To PROFESSOR D. LANZA, Director of the Botanical Gardens, Palermo, Italy, for a portrait of Senator Agostino Todaro, and the gift of pamphlets relating to him;

To MR. RONDET-SAINT, Paris, for the loan of pamphlets by his cousin, the late A. Defflers;

To MR. R. J. MINNEY, Manningtree, England, for biographical data regarding the family of Lady Clive;

To MR. A. F. TISSOT, Riverside, U. S. A., for gifts of plants and photographs;

To DR. T. ARZT, Wetzlar, Germany; DR. H. WALTER, Stuttgart, Germany; MR. CARLOS FAUST, Barcelona, Spain; MR. A. PROBST, Lugano, Switzerland; MISS J. J. E. VAN DEN THOORN, the Hague, Holland; MR. A. W. COCKS, Netherby, Australia; DR. LLEWELYN R. LEWIS, Los Angeles, U. S. A.; MR. JAMES WEST, San Rafael, U. S. A.; and MR. W. I. BEECROFT, Escondido, U. S. A., for gifts of photographs;

To MISS MARGARET WALKER, Summerville, U. S. A., for an original drawing;

To MR. W. E. RUDOLPH, Potosi, Bolivia, for the contribution of his *Stapelia* Map, and much assistance concerning the distribution of species;

To DR. HENRY K. SVENSON, Curator of the Herbarium; MRS. EMILIE PERPALL CHICHESTER, Library Assistant in Charge; MISS CONSTANCE PURVES ELSON, Assistant; MR. MONTAGUE FREE, Horticulturist; MR. HERMANN BECKER, Assistant, the Brooklyn Botanic Garden, Brooklyn, U.S.A., for gifts of plants and much assistance in research;

To DR. JOHN HENDLEY BARNHART, Bibliographer, the New York Botanical Gardens, New York, for frequent assistance in research and a gift of photographs;

To MISS EMMA B. HAWKS, Associate Librarian; and MISS C. BIEN, Assistant Reference Librarian, the Library of the Department of Agriculture; and MISS ALICE C. ATWOOD, Library of the Bureau of Plant Industry, Washington, U. S. A., for assistance in research;

To MISS ELIZABETH T. PLATT, Assistant Librarian, the American Geographical Society, New York, for assistance in research;

To MISS BETTY ERTEL, of the staff of the American Museum of Natural History, New York, for assistance in consulting works in the Library of the Museum;

To The United States Department of Agriculture, Division of Foreign Plant Quarantine, MR. W. A. MCGUBBIN, Acting in Charge, Washington, for many courtesies in connection with the importation of plants;

To PROFESSOR R. E. FRIES, Director, Bergianska Tradgarden, Stockholm, Sweden, for permission to reproduce a plate from the publications of the Tradgarden;

To MRS. MARLOTH, Capetown, for permission to reproduce a number of illustrations from Dr. Rudolf Marloth's *Flora of South Africa*, Vol. I, 1920, and Vol. III, 1932;

To THE CROWN AGENTS FOR THE COLONIES, London, for permission to reproduce a plate

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from Dalziel and Hutchinson's Flora of West Tropical Africa;

To THE CAPE TIMES, Capetown, for permission to reprint photographs from its pages;

To SOUTH AFRICAN GARDENING AND COUNTRY LIFE, Capetown, for permission to reproduce photographs from its pages;

To DR. P. FONT QUER, Director of the Museum of Natural Sciences, Barcelona, for permission to reprint a plate from the Bulletin of the Museum;

To THE ROYAL HORTICULTURAL SOCIETY, London, for permission to reproduce plates from Curtis's Botanical Magazine, and from the Dedications Volume of the Magazine;

To THE LINNEAN SOCIETY, London, for permission to reproduce plates from the Journal of the Society;

To THE GARDENERS' CHRONICLE, London, for permission to reproduce plates from its pages;

To THE CACTUS AND SUCCULENT SOCIETY OF GREAT BRITAIN, London, for permission to quote in Appendix C part of an article from the Cactus Journal;

To THE CACTUS AND SUCCULENT SOCIETY OF AMERICA, Los Angeles, for permission to reproduce photographs from the Cactus and Succulent Journal;

To DE NEDERL. VEREENIGING VAN VETPLANTENVERZAMELAARS, of Holland, for permission to reproduce in Appendix A an article from Succulenta;

To MRS. ELLEN K. ROOKSBY, Pasadena, U. S. A., for permission to reproduce a photograph from the Desert Magazine;

To MASSON ET CIE., Paris, for permission to reproduce plates from the Annales des Sciences Naturelles;

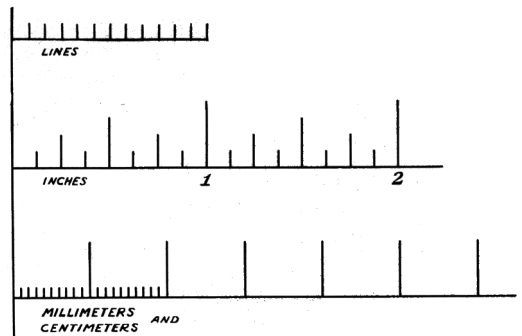
To the SOCIETE BOTANIQUE DE FRANCE, Paris, for permission to reproduce a plate from the Bulletin of the Society.

Our greatest debt of thanks is one which we cannot express, for during the preparation of this edition death has claimed DR. NATHANIEL E. BROWN, long the Dean of Stapelia students. We owe to Dr. Brown our first encouragement in studying the STAPELIEAE, and constant help and suggestions, as well as the permission to quote any of his writings, including the important Introduction to the Stapeliae Barklyanae, in Hooker's Icones Plantarum, from which we have reprinted an extract in Appendix E. One of the great incentives we have received towards trying to make this book as complete and accurate as possible was when he wrote, in answer to a request from us, that it would give him pleasure to have his name appear as one of our collaborators.

Death has also claimed DR. R. H. PULLEINE, of Adelaide, Australia, a great collector of succulents, who was of great assistance to us by his gifts of rare species, his photographs and his constant readiness to be of service at all times.

SCALES USED IN PLANT DESCRIPTIONS

NOTE: *It will be noticed that the descriptions of individual species give the measurements of the plants sometimes in the metric system and sometimes in the English system, according to the usage of the describer. Only a little practice is necessary to reconcile the use of the two systems, for roughly one inch is equal to 2½ centimeters, and one line to 2 millimeters. The following scale shows these proportions with greater accuracy:*



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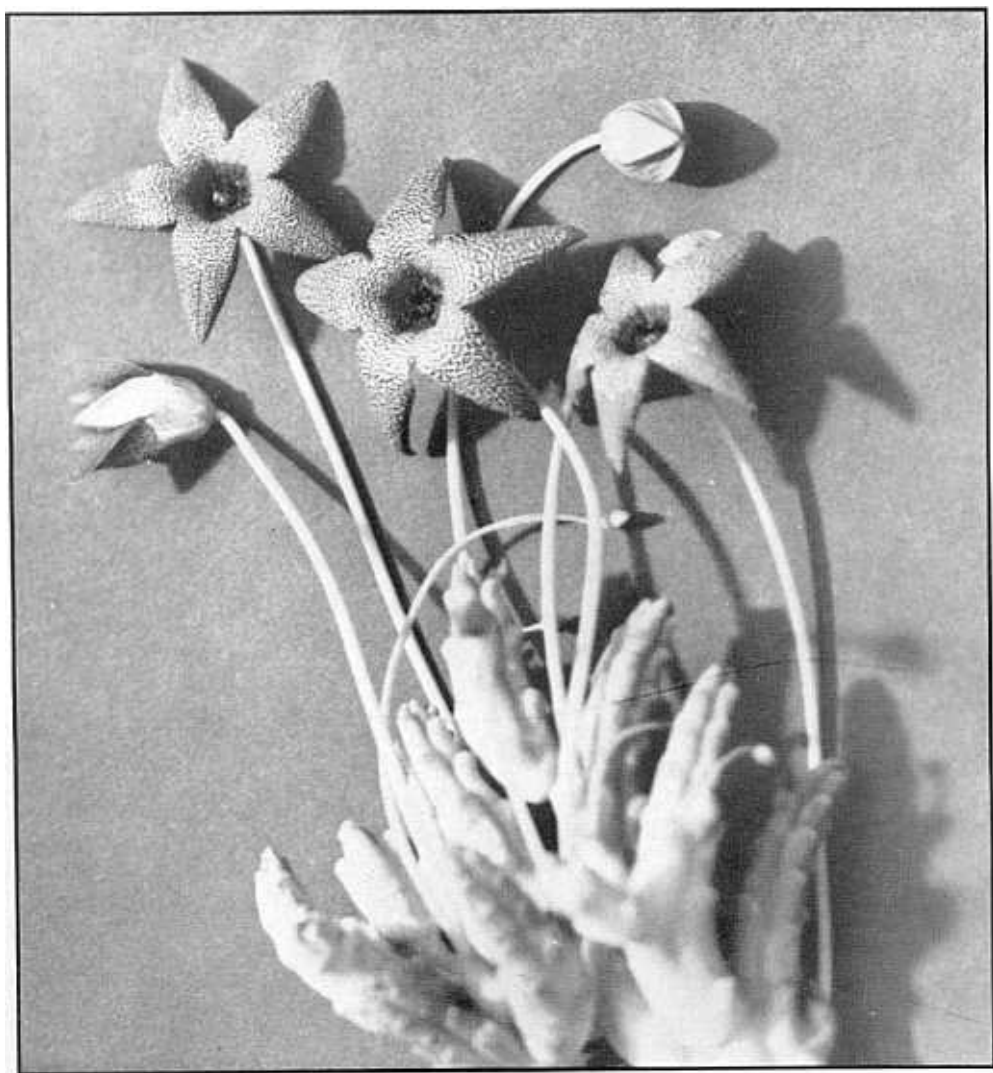
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THE STAPELIEAE



Caralluma aperta N. E. Brown x 1.

Photo by Carl Luckhoff.

THE STAPELIEAE

INTRODUCTION

An introduction to the STAPELIEAE may begin by saying that, omitting some intermediate categories, they are a Tribe of *Angiosperms*, of the Class of *Dicotyledons*, Sub-class of *Gamopetalae*, and Family of *Asclepiadaceae*.

The *Angiosperms* are Flowering Plants which bear their seed in a container, the name being derived from two Greek words meaning *receptacle* and *seed*. In the case of the Stapeliads this container is none other than the well-known twin-pod, typical of all Asclepiads, to which the Japanese give the appropriate name of "Cow's horns." Fig. 1 is a curious early drawing by William Paterson.

The *Dicotyledons* are *Angiosperms* which develop two "cotyledons" or seed-leaves in the plantlet or embryo. As the seed sprouts, the two seed-leaves persist and have their moment of prominence before the main stem begins to develop and they drop away. In Fig. 2 the two cotyledons of a *Hoodia gordonii* seedling are shown with the principal stem beginning to form between them.

The *Gamopetalae*, or *Sympetalae*, are *Dicotyledons* whose petals are not wholly separate, but form a partly united corolla.

The petals are united at their base into a common centre, which may be a flat disk, a bell-shaped tube or any other shape, while at their tips they are free in a series of lobes. It

is important to bear in mind that these free terminal lobes of the corolla are not the whole petals, but only the upper portion of petals, their basal portion being intergrown and forming the united central part. The corolla of the Stapeliads is unusually fleshy, and sometimes it is hard to realize that such a corolla is really made up of true, though partly united, petals. Sympetaly (the name

given to this character of corollas with petals partly or wholly united) is an advanced development in floral structure, one of the many responses to the intercourse between flowers and their insect visitors which have made flowers what they now are. It varies greatly in its manifestations, even in a small, closely related tribe, like the Stapeliads.



FIG. 1. *Trichocaulon* allied to *T. cactiforme* N. E. Brown x 0.35

From Paterson's Narrative, 1789.



FIG. 2

Hoodia gordonii seedling x 3.

At one extreme are species, like *Caralluma luntii*, in which the corolla petals are lobed almost to the very centre, the united portion being barely visible; at the other extreme are two genera in which the united portion almost swallows up the lobes. In the genus *Hoodia*, the corolla is flat or shallowly cup-shaped, and the lobes are so obtuse and ob-

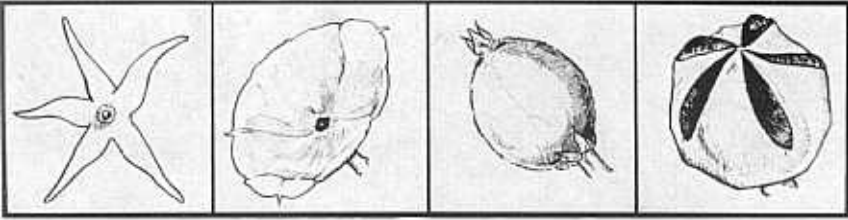


FIG. 3

Phases of Sympetaly in Stapeliads

- a. A *Caralluma* with lobes extremely cleft;
- b. *Hoodia* type, the petals intergrown into a flat bowl-shape, the lobes reduced to minute tips;
- c. *Stapeliopsis* type, the petals globosely intergrown, the lobes minute;
- d. *Pectinaria* type, the lobes connate at the tips.

From a drawing by Mrs. Richard Delafield.

solescent as virtually to merge into the circular corolla disk, only minute tips remaining free. In the genus *Stapeliopsis*, the united portion of the corolla forms a globose tube, open only at the apex in a tiny mouth whence the short lobes flare out abruptly. A singular form of sympetaly occurs in the genus *Pectinaria*, where the divided lobes are reunited, or connate, at their tips, giving the flowers the appearance of little cages, the only light and entrance to the inside being through the slits between the lobes, which are united at both top and bottom.

The *Asclepiadaceae* are a family of *Gamopetalae*, which includes about 220 genera and 2,000 species. The family, to which belong all the milkweeds of our own country, is marked by the milky or watery juice of its stems. In the Stapeliads this juice is usually of a slimy watery consistency only, but in a few species, as in *Caralluma cicatricosa*, it is quite milky.

The most important family trait of the *Asclepiads*, and botanically the determining trait, is that the pollen content of the anther cells is united into waxy masses, which are attached in pairs to pincer-like organs called pollen-carriers. These organs are unique and affect the entire fertilizing machinery of the flowers, which must be carefully studied to be understood. In the centre of the flower is a columnar body, round or five-angled in cross-section, which serves as the stigma. Into the upper part of this staminal column are embedded the five anthers, with their attendant pollen-carriers, and likewise one series or two series of five-fold lobes, which are called the corona. The purpose of the corona is primarily to allure visiting insects by means of the honey or nectar secreted at the base of the corona-lobes, which is often accompanied by a powerful odor. There is a surprising variety in the formation of the corona and of its lobes. When the corona consists of two series of lobes, these are called the outer corona and the inner corona; and when it consists of only one series, it is said that the outer corona is absent. The shape of the corona lobes or segments is very helpful in establishing the identity of any Stapeliad, or other Asclepiad, though the gradations of form overlap in so many respects that it is impossible to establish all the genera solely by reference thereto. We shall re-

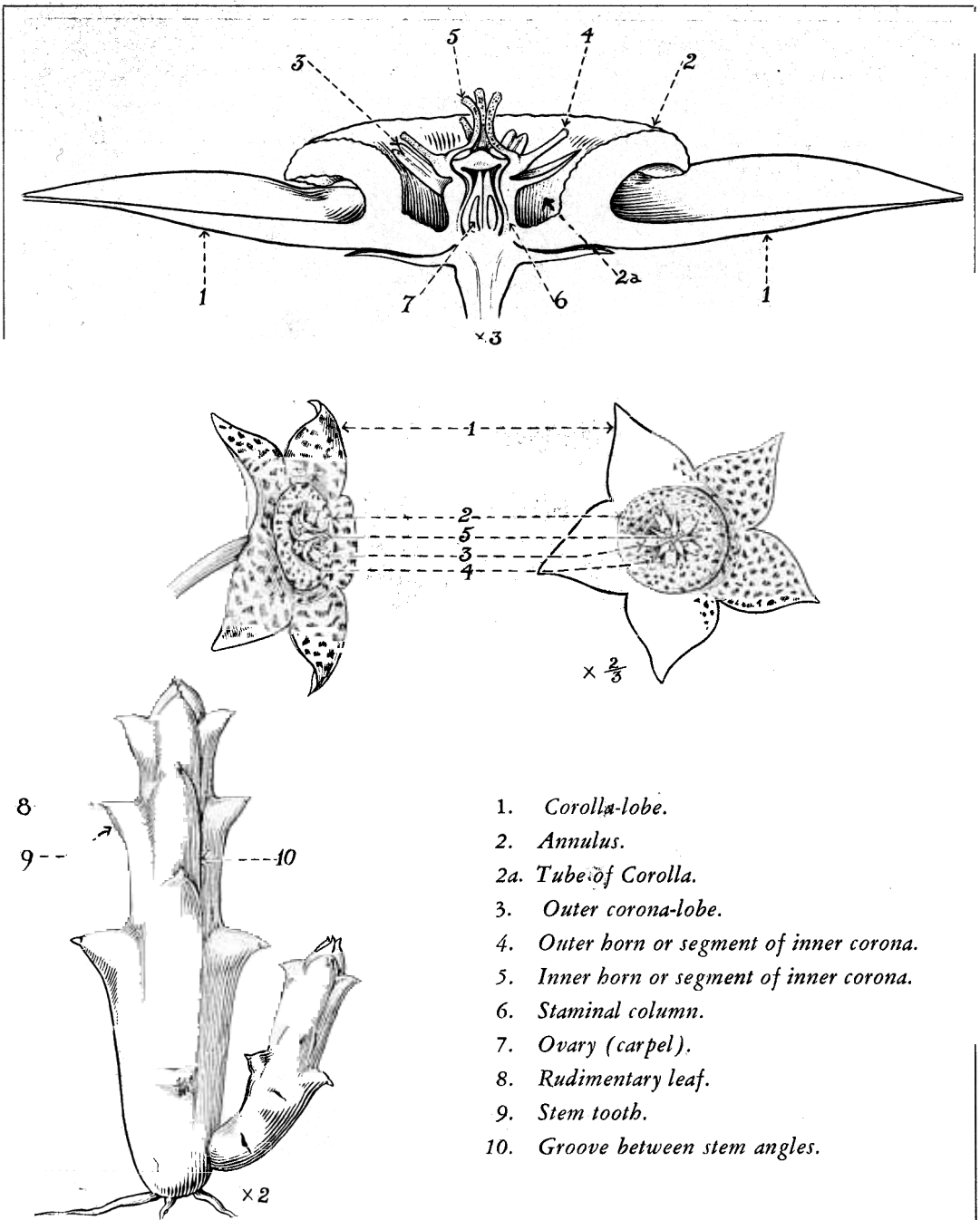


FIG. 4

The parts of a Stapeliad, based upon *Stapelia variegata*.

Drawn by Miss S. Ross-Craig of Kew.

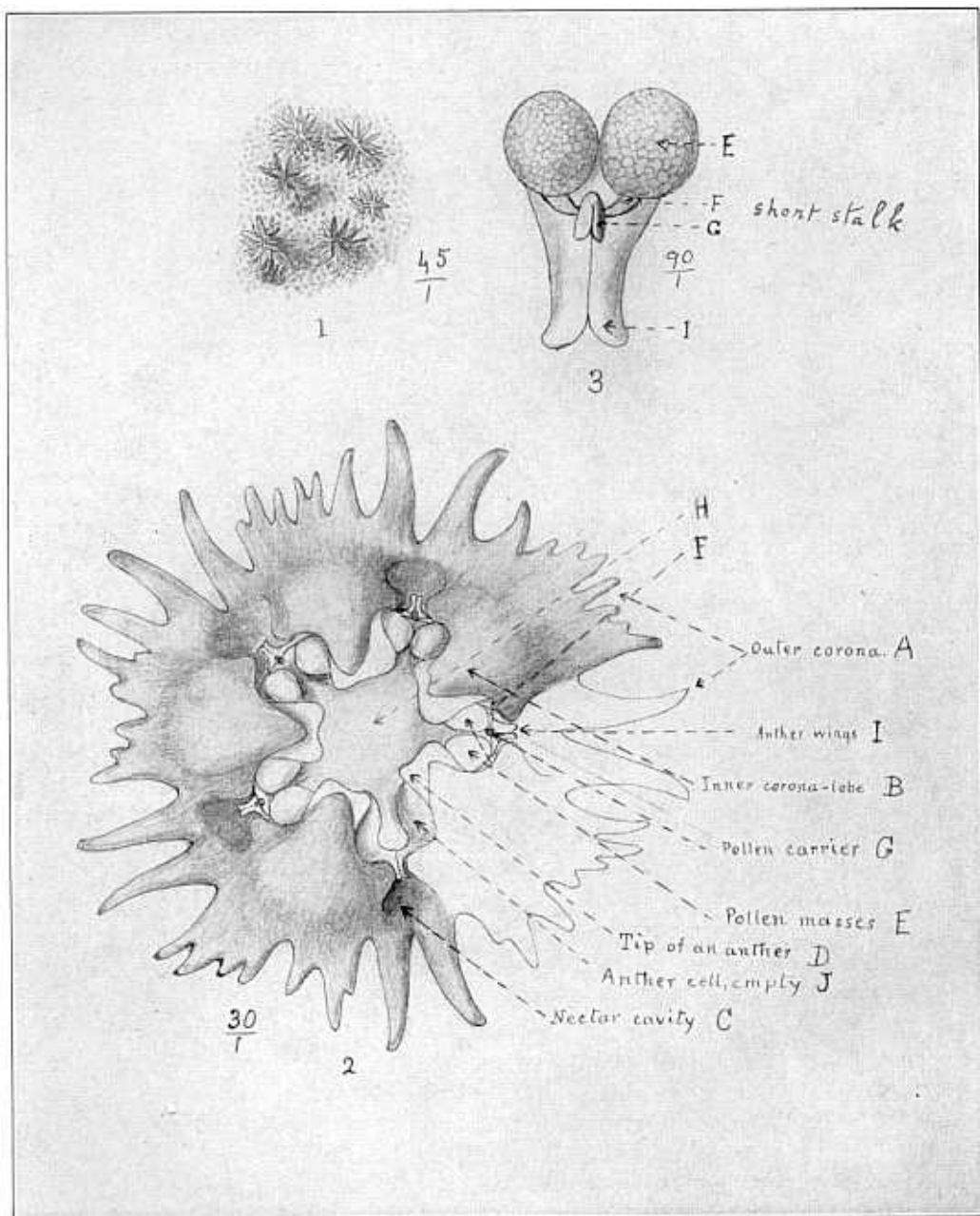


FIG. 5

Pectinaria asperiflora N. E. Brown

1. Spiked processes on papillae of corolla.

2. Corona. 3. Pollen-masses.

Drawing by N. E. Brown.

turn presently to mention some of the principal corona types, but first an explanation should be given of the general working of the staminal column as a whole. For this we are fortunate to be able to quote an excellent account by Dr. N. E. Brown of how the mechanism functions in the species, *Pectinaria asperiflora*, and this is illustrated in Fig. 5:2, which is a drawing of the corona and anthers of the same species, magnified 30 diameters.

"The whole corona of *P. asperiflora* is of a very dark purple-brown or blackish color. The outer corona (A) is toothed all around the margin; from its inner side project the five deltoid or tongue-like lobes of the inner corona (B). In the pocket-like spaces (C) between these lobes a slight amount of nectar is secreted to attract insects. The inner corona lobes (B) rest closely upon the backs of the whitish anthers (D), which they partly conceal. The pollen-grains in each anther-cell are not loose as in most plants, but are united into a globose, yellowish, waxy mass, just as they are in orchids, and are exposed to view (E). These pollen-masses are attached in pairs by very short stalks (F) to a pollen-carrier (G). There are five pollen-carriers and in each of them the pollen-mass attached to its right-hand side belongs to one anther and that on the left-hand side belongs to a different but adjacent anther.

"The pollen-carrier (G) is better seen in Fig. 5:3. It is a very remarkable structure, which does not occur in any other family of plants, although it has an equivalent in the family of the ORCHIDACEAE in the gland to which the pollen-masses are attached. In all *Asclepiads* the pollen-carrier and the stalks of the pollen-masses are not formed of cells, as are all the other parts of the flower, but of a more or less horny secretion exuded by the tissue on which they rest. Each pollen-carrier is hollow, open at the lower end, closed at the top, and slit down the outer side; the edges of the slit meet closely except at the lower end, where they gape, see Fig. 5:3 at (G).

"The central part (H) is the top of the style, not the stigma, and is white in color. The stigmas are five in number and absolutely concealed from view, being cavities in the interior of the style-top, the only access to them being by means of a minute opening under the structure (I), which latter is of the utmost importance to the flower, because it is only by means of it that fertilization can be effected. It is formed in this way: From the base of each anther or from each filament immediately below the anther a wing-like growth extends on each side, directed slightly outwards half across the interval between two anthers or stamens, so that the edge of one anther-wing meets, but it is not united to, the edge of the anther-wing of an adjacent anther, except at the lowest point, where they gape and form a small wedge-shaped opening. This opening and cleft is vertically under the cleft in the pollen-carrier, and behind it is the stigmatic cavity.

"Now for the action of all this complex structure. The creature that enters one of these flowers does so primarily to sip the nectar in the cavities (C). In doing this it is almost certain that a leg, antenna, hair or the tongue will get inserted in the gaping

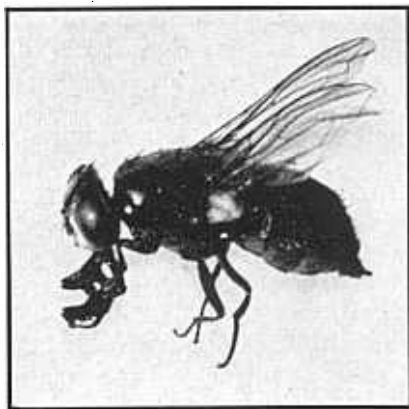


FIG. 6

Fly carrying pollen
from *Stapelia*

basal part of (I) and caught by the meeting edges of that structure, which are elastic and act like springs. As the insect tries to withdraw its captured member it pulls it higher up the cleft of (I) until it enters the very similar gape of the cleft in the pollen-carrier, see Fig. 5:3 at (G), where it is again entrapped and held fast by the elastic edges of the cleft in this structure, which, being loosely attached, is pulled away, with the pollen-masses attached to it, leaving the anther-cells empty (J).

"The insect upon visiting another flower carries the pollen-masses with it, and one or occasionally both of them may enter the gaping opening of (I), when the same process occurs I have just described, but the pollen-mass is too large to be pulled out of the cleft, so when the stalk reaches the top and is about to pass into the cleft of the pollen-carrier, it breaks from the stalk and is left behind in the stigmatic cavity, where it soon produces a bundle of pollen-tubes and thus effects fertilization."

The ovaries are located just beneath the stigmatic crown. There are two in each flower, standing side by side like little ninepins, separate from one another, but adhering by their tips to the underside of the crown above. In time they develop into twin seedpods characteristic of the family, already illustrated in Fig. 1. To watch the seedpods of any *Asclepiad* open and the myriad flattened seeds unfold, each sustained by its silky hairs and hanging for a moment in expectancy and then, squadron by squadron, all sailing forth into the unknown, drifting on the wings of the lightest breeze, is an experience never to be forgotten. It is impossible to give an adequate idea of the miracle by photography, because the essence of it all is motion; but a hint may be caught in Fig. 7, where some seeds of *Duvalia polita* have just issued from the pod and are awaiting the call of the first puff of air to begin their colonizing ventures.

The seeds of the Stapeliads are remarkable for their vitality, the rapidity with which they will germinate under favorable conditions and the length of time during which they will remain active. Dr. N. E. Brown says that most of the species he has tried, sown in moist sandy soil and placed in a greenhouse heated in summer only by the sun's rays, have germinated in 36 hours, many in 24. On the other hand seed of some species will germinate readily even after being kept for ten years.

Prof. Dinter has commented to us on a peculiar property of many different species of Stapeliads he has observed in South West Africa, *Stapelias*, *Carallumas* and *Hoodias* alike. He says that often the calyx and staminal column of a particular flower will remain alive long after the corolla has withered and fallen away. They may persist in this way for six months or longer and then suddenly one detects full-grown seed-pods, which in due course produce perfect seeds. The ovules evidently had been fertilized at the right time, but how the maturing of the seed-pods could be postponed for so long is a mystery. Other flowers on the same plants often produced perfect seed-pods at once. Obviously, in an arid country where long droughts are usual, a plant able to control two seed dispersions separated by intervals of several months stands a greatly increased chance that some of the seeds will be scattered under favorable conditions and so will succeed in taking root and carrying on the race.

The Asclepiads have been divided into tribes according to the nature and position of the pollen as it exists in the anther-cells. In the STAPELIEAE and CEROPEGIEAE the pollen is united into waxy masses, which are not wholly opaque, but pellucid along one margin or just beneath the apex. Owing to the similarity in the pollen-masses and in the pollen-carriers in these two tribes, some botanists, including K. Schumann, have thought to combine them into one, but other considerations have led to their being kept separate.



FIG. 7

Bursting seed-pods of *Duvalia polita* N. E. Brown x 0.6

Photo by Dickson & Thurber.

Their near relationship should not, however, be forgotten, and there are characteristics in some Stapeliads which find a nearer parallel in the Ceropegiads than in any other species in their own tribe. A single instance of this is found in the connate tips of the corolla-lobes of the genus *Pectinaria*, to which we have already referred. This feature occurs in no other Stapeliads, but it is not uncommon among the Ceropegiads, where it occurs in three genera and some fifty species.

But in general the STAPELIEAE and the CEROPEGIEAE are kept fully distinct by the suc-

culent habit of the former. Their short, mostly toothed, fleshy stems, indeed, resemble those of certain other families of xerophytic plants much more than they do the stems of any other tribe of Asclepiads. Some of these other tribes do reveal a slight predisposition to succulence, and collectors are familiar with the odd vine-like stems of *Sarcostemma viminalis* and the thickened showy leaves of *Hoya carnosa*. In the Ceropegiads, which are natives of the hotter parts of India, tropical Africa, the Mascarene Islands and the Cape regions, this tendency towards succulence is met again, and in particular *Ceropegia stapeliaeformis* suggests the Stapeliads somewhat in appearance as well as in name.

It may not be wholly fanciful, on the whole, to imagine that the Stapeliads were derived from some common origin with the Ceropegiads. The pedigree of the Stapeliads was doubtless through semi-succulent ancestors living somewhere in the tropical regions of British India and kindred to the surviving single species of the genus *Frerea*. The ability of the Stapeliads to store sustenance in their increasingly succulent stems adapted them to venture forth into semi-arid lands, and in due time one may suppose that they set out to explore the dryer parts of the earth, so far as these lay within reach of their seed-flights and other methods of travel. Their treks may be pictured as taking them in many directions, easterly into Burma, southerly to Ceylon, northwesterly across Baluchistan and Afghanistan, doubtless through Iran, across northern Arabia and Sinai, around the southern shores of the Mediterranean into southern Spain, even beyond the Gardens of the Hesperides (*Caralluma hesperidum*) to the lava beds and volcano summits of the Canary Islands (*C. burchardii*). So far the adventurers were all *Carallumas*, plants with flowers quite similar to *Frerea* in their corona forms and with stems sometimes still tapering towards the apex, but having surrendered all save rudimentary traces of true leaves, stems often of fairly uniform thickness throughout, of much shorter length, becoming roundly and then acutely angled, gradually more and more toothed along the angles and of increasing succulence, the flowers still small, averaging about 1/2-inch in size, sometimes hanging pendulous from the sides of the stems, then tending to small lateral or terminal clusters, and finally forming much larger terminal umbels, the flowers becoming more lurid in color and catering with strange carrion odors to the flies and other insects of each new land they visited. In Arabia a great new adventure began. Part of the tribe turned south and found congenial conditions in the districts of Yemen and Hadramaut, where striking changes of flower form and of stem form began to manifest themselves. Here were born three new genera, *Echidnopsis*, with unique tessellate cylindrical 6 to 10-angled stems, the flowers retaining the *Caralluma* structure; *Huernia*, whose flowers have the united portion of the corolla produced into five smaller intermediate points at the sinuses between the corolla-lobes; and *Duvalia*, with a narrow raised annulus on the corolla and the outer corona compressed to a circular disk within the annulus, effectively bottling up the small central corolla-tube. Thus encouraged with new forms to meet new conditions, the tribe crossed the Red Sea to the Sudan and Eritrea, and pressed on to the west towards the Sahara and to the south, across Ethiopia, towards the Equator and the distant Promised Land of South Africa.

All this time there were constant exploratory drifts in every direction, bewildering experiments in adaptation to new environments and hybridization. For instance on the island of Socotra lives one of the two species of *Edithcolea*, remarkable for the dilated tips of its inner corona-lobes. To the north, in Southern Arabia, lives *Caralluma anemoniflora*, allied in a measure by the shape, but not by the texture, of its inner corona; and

to the west, in Somaliland, lives a second true Edithcolea. One may wonder by what routes such gradual modifications crossed and recrossed the Arabian Sea.

All this time, too, the Stapeliads were trying to allure their visiting insects with new patterns of flowers, vast terminal umbels of 100 or more individual flowers forming purple tennis-balls four inches or more in diameter (*Caralluma retrospiciens*), tiny single flowers a tenth of an inch in size (*Echidnopsis nubica*), corolla-lobes more slender in shape and more deeply indented than had previously been seen (*Caralluma baldratii*), strange swollen rings on the corolla-disk (*Huernia somalica*), increasing emphasis on a hairy or papillate zone at the centre of the corolla to guide the movements of visitors approaching the corona. In British Somaliland was born the only species of a new genus, *Drakebrockmania*, with singularly thick stems, devoid of teeth, and separated from the floral architecture of the *Carallumas* by the elevation of the inner corona-lobes upon a raised stalk.

The drift of seed to the westward continued around the confines of the Sahara desert to Timbuctu on the distant river Niger (*Caralluma retrospiciens* and its varieties), out to the far corners of West Tropical Africa (*C. dalzielii*), and over the tree-tops of the great rain forests of the northern Congo (*C. schweinfurthii*). The journey of *C. dalzielii* awakens images of long-forgotten record flights, for it is one of the few tapering-stemmed *Carallumas* in Africa, and its nearest kindred are *C. vittata* and *C. longidens*, more than 2,000 miles to the east near the fifth cataract of the Nile.

At the Equator, growing on Mt. Kenya at an elevation of 6,000 feet, half-way between the tropical vegetation of the foot-hills and the perpetual snows of the summit, *Huernia keniensis* separates the Stapeliads of North Africa from the species below the Line. The first member of the genus *Stapelia* is soon encountered (*S. dummeri*), growing on the Mea Hills in Kenya. *Stapelia* separates itself so gradually from *Caralluma* that any exact demarcation between the two is hard to put into words. In general the difference consists in the outer corona of *Stapelia* having distinct lobes, free to their base, not partially intergrown in the manner of *Caralluma*, while the inner corona-lobes are not dorsally connected with the outer corona. The inner corona-lobes of the *Stapelias* are varied in form, single, or bifid, or two-horned, or composed of a single slender horn with a broad dorsal wing. The corollas are on the average larger than in the *Carallumas*, attaining a maximum spread of about 16 inches in *Stapelia gigantea*. A number of species have a central corolla annulus. The stems, with one 6-angled exception, are 4-angled, often pubescent.

The drift of the Stapeliads below the Equator soon broadens out, their main route passing through the Rhodesias and the Transvaal into the Cape Province, with an excursion to the east across Portuguese East Africa to the island of Madagascar and a wide sweep to the west across the Kalahari regions of the Bechuanaland Protectorate to South West Africa and slightly north again into Angola. In Madagascar occurs a curious endemic genus, *Stapelianthus*, its flowers separated from *Huernia* mainly by an erect outer corona.

Three new genera are found in the northern Transvaal, at least one being known also from Southern Rhodesia, *Huerniopsis*, whose flowers have the corolla-lobes curiously "excavated" where they merge into the tube, *Stultitia*, with flowers differing from those of *Caralluma* only because they have a distinct annulus on the corolla, and *Tavaresia*, a genus with many-angled stems, the stem-tubercles each tipped with three spines. Several of the northern Transvaal species, with their varieties, have very long ranges, virtually

spanning the entire continent to South West Africa. Among these are *Duvalia polita*, *Caralluma caudata*, *Huerniopsis decipiens*, *Stapelia kwebensis* and *Tavaresia grandiflora*.

While the furthest point attained in the whole long journey of the Stapeliads is on Cape Point, almost at the Cape of Good Hope (*Stapelia variegata*), the most ideal conditions for the tribe were found in the Great Karroo and Little Karroo areas of the Cape Province, and in Great Namaqualand and Little Namaqualand, the north-west corner of the Cape Province and the southerly portion of South West Africa. In this desert land of plenty, a very large number of species are found and eight new genera. Here, in the Karroid areas, is the monotypic genus *Diplocyatha*, with its raised central annulus forming a second cup within the corolla; here is *Piarranthus*, with stems akin to *Duvalia* and very characteristic flowers quite devoid of an outer corona; here is *Pectinaria*, with its cage-like corolla, the lobes connate at the tips; here is the happy hunting ground of genera already encountered much farther north, especially of *Stapelia* and *Duvalia*, and in slightly lesser degree also of *Caralluma* and *Huernia*.

Here finally is emphasized the tendency of the species to develop a greater number of stem-angles. Several species of *Caralluma* for the first time have stems with 5 and 6 angles, instead of the conventional 4 angles. One *Huernia* (*H. pillansii*) inexplicably comes forward with stems of 20 to 24 angles, and four new many-angled genera appear, *Hoodia* and *Trichocaulon*, *Luckhoffia* and *Hoodiopsis*. *Trichocaulon* is a normal form of *Caralluma* as to its corona, but so distinctive in its tubercled stems, the tubercles now tipped with bristles, now quite spineless, that its right to constitute a separate genus cannot be opposed. *Hoodia* has stems with angles even more ruggedly spine-tipped, and its flowers possess a wholly individual corolla, the limb forming a circular disk, with the lobes nearly obsolete. Both *Hoodia* and *Trichocaulon* occur in the Cape Province, but they are more widely represented in South West Africa. *Luckhoffia*, a monotypic genus with 8-angled tuberculate stems and flowers reminiscent of *Stapelia*, is native to the western Cape Province. *Hoodiopsis*, which curiously blends features of the *Hoodias* with a background of *Stapelia*, and resembles *Luckhoffia* in its 7 to 9-angled tuberculate stems, is also known only in a single species, from Great Namaqualand in South West Africa. A final monotypic genus, *Stapeliopsis*, appears in Little Namaqualand, with 4-angled stems, a corolla singularly globose and an outer corona wholly distinct, strikingly erect and tube-shaped.

The development of these many generic types in many widely modified species could not have been visioned by the liveliest imagination when the Stapeliads left their first home 5,000 miles away in India an unknown number of years ago. The story of such an Odyssey, from India to the Karroo and Namaqualand, like that of the Cactus family from lower South America to Mexico and the south-western United States, cannot but stimulate wonder as to how such migrations come to pass and what the guiding forces behind them may be.

The mention of Cacti suggests the fact that no member of the STAPELIEAE is native to the western hemisphere, just as no member of the Cactus family is found native in the eastern hemisphere. An apparent exception is provided by the names of six species of *Stapelia* (*S. erecta*, *S. herbacea*, *S. lutea*, *S. parcololate*, *S. quinqueangularis* and *S. campanulata*) mentioned in the Flora Mexicana of Sessé and Mocino, and the inclusion of these references in one of the great botanical Indexes leads someone every now and then to cite the species as possible Mexican *Stapelias*. However, as Dr. Paul Standley of the Field Museum in Chicago has written us, the works of Sessé and Mocino, resur-

rected and published in 1893, were written a century earlier and are proverbially inaccurate, and their so-called *Stapelias* must be considered as belonging to some other tribe or family, no longer recognizable.

While their crown of silken hairs has served to carry the seeds of the Stapeliads over very long distances, it has produced another effect, of keeping the seeds in motion, when they are near the ground, until some bush or other obstruction forces a definite halt. In consequence the Stapeliads are usually found growing under the shelter of bushes and low trees, as if they welcomed the partial shade, though a few species (such as *Stapelia pachyrrhiza* and some of the large *Carallumas*, *Hoodias* and *Trichocaulons*) generally grow in the open.

Mrs. F. W. Barber said of the tribe: "A stranger unaccustomed to seek out their hidden abodes might traverse the whole country without seeing a single specimen, and yet they are so well dispersed that no locality is without especial varieties. They lie hidden in remote nooks and corners, in which they may so easily be overlooked, even when you know them well, that you find them when you are not expecting; you come upon them, as it were, unawares, beneath some shady bush or perchance clinging to the face of a rugged precipice, or behind some projecting rock."

The adaptability of the Stapeliads to their environment is very striking, but they present many problems as to *how* they accomplish certain things or *why* they do certain others. As yet no one has fathomed the secret of the ciliation, or fringing, of the corolla-lobes in many species with vibratile clavate hairs. No one has suggested a reason why the *Trichocaulons* in some species should tip every tubercle of their many-angled stems with a bristle or spine, while in other species equal care is taken to avoid all trace of such bristles. No one has more than guessed at the relation which may exist between the number of stem-angles in different species and the drought conditions to which they are normally subject. And most tantalizing of all, the problem of the corolla rings, so variable in character in *Stapelia* and *Stuliitia*, *Duvalia* and *Huernia* seems an impossible one to understand. Are they intended only as wind-breaks to shelter the corona? Are they in some way a convenient landing stage for flying insects near the business centre? But whatever the attractions may be which the Stapeliads provide for their visitors, their only interest in these visitors lies in making them serve as carriers of pollen. There is no quid pro quo. For awhile the flies may linger about each lurid flower, lay their eggs at its centre, breed innumerable maggots. It is all vanity. There is no nourishment in this vegetable sham-carrion, nothing but disillusion behind the enticing odors and the festive colors. After two or three days the maggots perish of starvation, the flower withers and the little tragedy is finished, to begin again on other flowers in an endless repetition.

The ability of Stapeliads to attract the desert flies and a predisposition to succulence were doubtless principal factors in enabling the tribe to dwell in the semi-arid societies they frequent. But they are by no means wholly dependent on an ultra-dry climate. It is perhaps more accurate to say that they can live in semi-arid lands, in spite of the absence of rain, rather than that they seek out such regions because of the negligible rainfall. The competition there may be less. Dr. Marloth has pointed out that such plants as heaths and proteas have no corresponding power of adaptation and would never advance even the smallest distance into the Karroo or any other semi-arid region, but that the Stapeliads, like other succulents, do not hesitate on occasion to venture out from the dry areas and are then found associating with these same heaths and proteas.

When a Stapeliad is found outside of the dry areas, it is not unusual for the stems to be taller and the flowers larger, and these modifications are more marked when the plants are grown in garden soil or in greenhouses. Prof. Dinter has said that the flowers of *Hoodia juttae* are twice the size, when cultivated in a garden, that they are in natural surroundings; and Mr. Pillans has said that the stems of *Stapelia flavirostris* are narrower and more elongated when growing wild near the south coast of the Cape Province, where the rainfall is heavy, than when growing inland. The point is important, because the length of stem of any species, as stated in the description, should be based on that of plants in the wild state, whereas the collector may have a home-grown specimen with much longer stems, which he finds difficult to reconcile with the published description. The otherwise admirable colored plates in Jacquin's *Stapeliarum Descriptiones*, 1806-19, show stems so greatly attenuated by excess watering as sometimes to be actually misleading. Continual allowance must be made in the matter.

Continual allowance also must be made by the collector for modifications of flower form in his specimens due to hybridization. This is particularly true in plants related to *Stapelia hirsuta* and *S. variegata*. Here the hybrids have become so numerous and so confused that any attempt to make one's specimens agree with the names on the labels that currently accompany them will probably be foredoomed to failure. Fortunately the number of true species is large, and every year more are being made available to collectors.

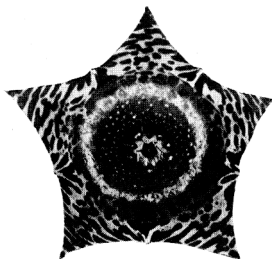
There has been, it is true, some fear that certain species were doomed to disappear. Many have commented on this. Sir William T. Thiselton-Dyer, editor of the *Flora Capensis*, said in the Introduction to the fourth volume, 1909, speaking of the Stapeliads, "It is to be feared that one of the most striking features of the South African flora is doomed to gradual and irremediable extinction." Mrs. Barber (*Kew Bulletin*, 1903) wrote to the same effect: "These interesting plants are rapidly disappearing from all parts of South Africa. Civilization and colonization are both dead against them. They are eaten up by all kinds and conditions of cattle. For instance, if an ostrich finds a *Stapelia* plant, he seldom leaves without taking nearly the whole of it with him. Cattle, sheep and goats, in like manner feed upon them greedily. The native tribes during years of severe drought and famine use these plants as food, and native children delight in their sweet young succulent branches. The florist and the gardener go hand in hand with the rest in this work of destruction, for you will hear them exclaiming, 'Oh! here is one of those curious *Stapelias*,' and it will speedily be pulled up and planted in some flower-bed, where for want of care it will be overgrown by other plants and lost."

Just how far the tribe may actually be in danger it is hard to state. The strongest argument in favor of the belief that some species are disappearing is found in a study of the species enumerated by Francis Masson in his treatise, the *Stapeliae Novae*, in 1796. Of the 36 Stapeliads discovered by him, six have never been collected since, and it is a natural assumption, in view of the careful search made for all Cape succulents over many years, that these have vanished altogether and that others are vanishing along with them. But there is another side to the question. Many species are of local distribution and may only occur in a few places. Masson happened to find a certain set of plants, while other collectors have found many other species wholly unknown to him. His plants might nearly all be rediscovered, if one could follow exactly in his tracks. Evidence supporting this view is furnished by the rediscovery during the past ten years of eight others of his plants, all previously counted as lost.

Our knowledge of the STAPELIEAE has come slowly, yet there have been periods when

a more rapid progress, alike in the discovery of new species and in the study of their classification, has been stimulated by special circumstances. Such was the period of Francis Masson himself and of the botanists, Robert Brown and Adrian Haworth; such was the period of Sir Henry Barkly's governorship at the Cape, from 1870 to 1877, and the early studies of N. E. Brown; such were the opening years of the present century, when Dr. Brown was completing his revision of the whole family of Asclepiads for the Flora of Tropical Africa and the Flora Capensis, and N. S. Pillans was supplying him with an extraordinary series of new species; such were the voyages of Prof. Kurt Dinter to South West Africa, and the studies made of his plants and of the tribe in general by Alwin Berger; and such happily is the present time, when the Botanical Survey of South Africa under the direction of Dr. I. B. Pole Evans is once again stimulating a general interest in the search for new species.

Much yet remains to be done. The interest of botanists and amateurs alike, who are willing to go far enough afield in quest of new species, is likely to be richly rewarded for many years to come. Much systematic work is also necessary before a satisfactory review of the tribe will be possible. Miss Obermeijer has defined the present situation very clearly. "In some cases," she writes, "existing species are separated on very small differences indeed, whereas in other cases more important distinctions between plants, still assigned to a single species, have been overlooked. Moreover the STAPELIEAE vary to a marked degree and one sometimes wonders whether one is not describing a specimen rather than a species. This variability may be due to cross-fertilization, as N. E. Brown said, but while believing this to be so I would like to see actual experiments carried out. For instance it is not enough merely to record and describe all the forms, let us say, of *Caralluma lutea*. It would not entail so much work, but rather several years of patient waiting, to collect the necessary seeds and then watch them develop and come into flower and tell their story." Here is an invitation to which collectors in many localities can respond.



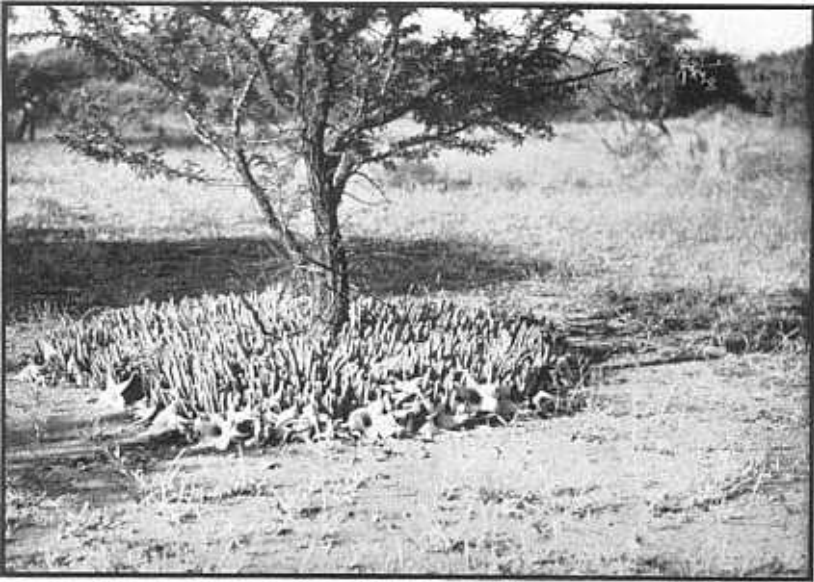


FIG. 8

Stapelia nobilis N. E. Brown

Photo by I. B. Pole Evans of a plant in natural surroundings under an Acacia tree on the Springbok Flats, in the Waterberg district of the Transvaal.

DISTRIBUTION OF SPECIES

India, Afghanistan and Ceylon. (By P. V. Mayuranathan).

The great empire of India occupies all the peninsula which juts southwards from the central mainland of Asia, between the Arabian Sea and the Bay of Bengal, while to the north it extends far into the mainland, to the Himalaya mountains and on the north-west to Afghanistan and Baluchistan. Further east, the Province of Burma continues far south again along the eastern shore of the Bay of Bengal. The island of Ceylon is a separate colony situated just off the southern tip of the Indian peninsula.

The total area of India exceeds one and three-quarters millions of square miles. It is divided into sharply contrasting regions: the stupendous mountain ranges in the north, which separate the empire from adjoining countries save through a few difficult passes, such as the famous Khyber Pass into Afghanistan; the vast plains watered by the rivers which drain the Himalayan watershed, extending from the Punjab in the north to Bengal in the east and Sind in the west; the tableland covering the greater part of the strictly peninsular portion of the country, including the Presidencies of Madras and Bombay

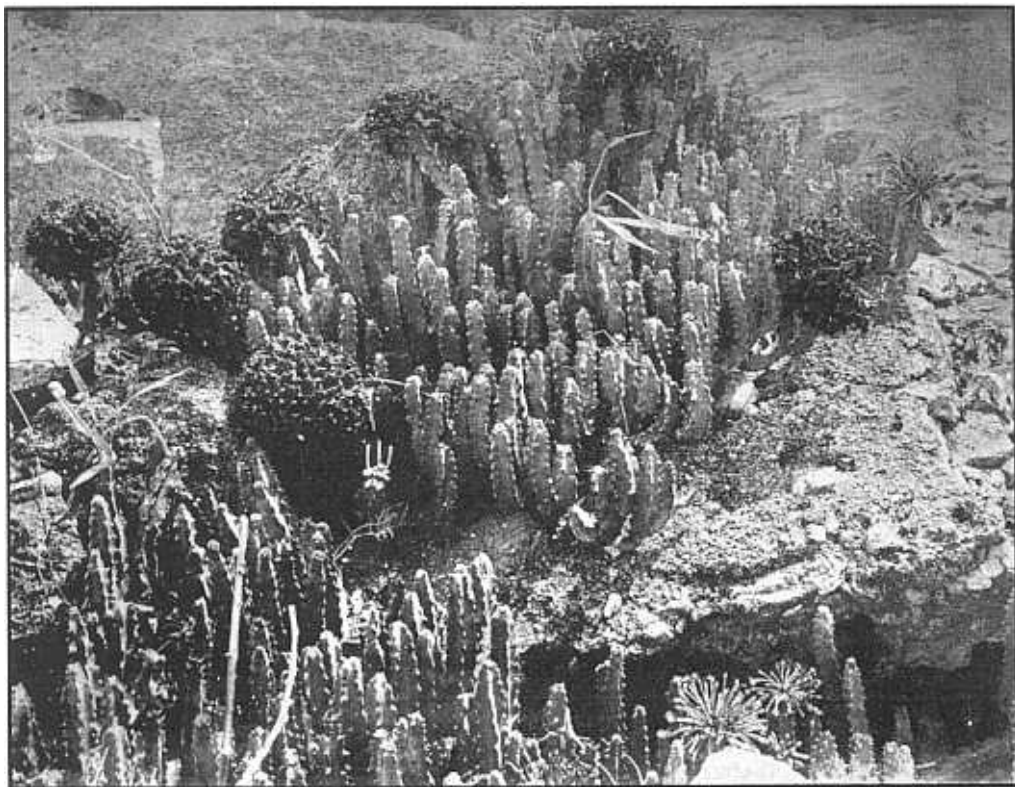


FIG. 9

Caralluma umbellata Haworth

Photo by P. V. Mayuranathan of a plant in its natural surroundings in the Madras Presidency.

and the southern native states of Hyderabad, Mysore and Travancore; the coastal plains, humid on the west coast, comparatively dry on the east; the Brahmaputra basin of Assam; and finally the Shan plateau and the Irrawaddy basin of Burma.

The climate throughout the empire is dependent primarily on the monsoon winds. When the north-east monsoon blows, from December to May, it brings the dry mountain air from the Himalayas to nearly the entire country, with wide daily fluctuations in temperature and little rain; whereas the south-west monsoon, from June to September, brings more or less continual rains from the Indian Ocean, with great humidity and small temperature changes, except on the Madras coast, which is inundated by the torrential rains of the retreating monsoon in November. The distribution of the rainfall is complicated by many secondary causes and is extremely uneven, varying from the prolonged droughts of the Deccan tableland to annual rains of several hundred inches where the mountains inland from the head of the Bay of Bengal precipitate the monsoon clouds that pour in from the Bay.

The Stapeliads of India include a dozen species, of which all but one are *Carallumas*. The exception is *Frerea indica*, a unique leaf-bearing species from Poona near Bombay. The *Carallumas* begin with two species in the far north-west, *C. tuberculata* from the Punjab and Baluchistan, and probably also from Peshawar and Afghanistan, and *C. edulis* from the Punjab, Baluchistan and Sind. Seven species occur in the Madras Presidency and its dependencies: *C. diffusa*, *C. indica*, *C. pauciflora*, *C. procumbens*, *C. umbellata*, and two members of the *Eucaralluma* section, *C. stalagmifera* and the most widely distributed of all the Indian species, *C. adscendens* and its varieties. The last-named occurs also, in certain of its many forms, in the Bombay Presidency and in outlying Burma and Ceylon. The only other *Caralluma* from Bombay is *C. truncato-coronata*, while *C. crenulata* is endemic in Burma and *C. umbellata* reappears in Ceylon and in the French district of Pondicherry.

The Stapeliads in India grow from near sea-level to about 4,000 feet elevation. As elsewhere they are plants of dry areas, but they support a slightly higher annual rainfall than their relatives in other countries, from 20 to 50 inches. *C. adscendens* var. *attenuata*, at one of its stations, endures a mean annual rainfall of nearly 80 inches. This happens at Pallassana in the Palghat gap, where the heavy rains are supplemented by moist atmospheric conditions during most of the year. Compensatory conditions are provided by the fact that the Palghat gap is subject to the incessant action of a very dessicating land breeze for two months in the year. Further the isolated area in which this variety has found itself a home is on the slope of a hill where water-logging is impossible; and under these conditions the radiation of heat from the bare surface of gneissic rock adjoining the area may perhaps help to create a favorable environment for the growth of xerophytes.

The Indian *Carallumas* usually grow on comparatively soft earth. They cannot tolerate an alkaline soil. *C. procumbens* grows in earth between crevices of rocks and spreads its long stems over the surface of the bare rocks. Attempts to cultivate this plant in Madras have failed as it is very difficult to create an artificial habitat like the one to which it is native.

The larger members of the *Boucerosia* section always grow in exposed situations, often forming extensive patches. The type of *C. adscendens* also stands full exposure. On the other hand *C. stalagmifera* and the varieties of *C. adscendens*, together with the species of the *indica* group of *Boucerosias*, have a predilection for a certain amount of

shade. These plants are all less hardy than the larger *Boucerosias* and do not fare as well in cultivation. Plants under whose shade they usually grow include various species of *Acacia*, *Opuntia*, *Euphorbia*, and others.

C. adscendens var. *attenuata* and *C. stalagmifera* have suffered disastrously on account of the destruction of the prickly pear by the recently introduced cochineal insect. Lately many specimens of these two plants have been seen in the Ceded Districts of the Madras Presidency, standing fully exposed as a result of the extermination of the *Opuntia* bushes under which they had been thriving. Their stems were as brown as dried twigs and had become weak from dessication, and they were evidently in the last stage of their existence. Normally the *Carallumas* have greenish stems, but under too dry or too exposed conditions they turn a brown color.

The main flowering season for most of the Indian *Carallumas* is the period just after the monsoon rains, which occur at different times in different regions. Species belonging to the *Eucaralluma* section flower more or less continuously except at times of extreme drought.

Socotra.

Socotra is the largest of a group of islands in the Indian Ocean, near the north-east tip of the African continent, lying on the route from India to the Suez Canal. Its area is about 2,500 square miles. The island consists of an undulating limestone plateau of 1,500 feet elevation, with the Haghier mountains, the surviving trace of ancient continental connections, at the centre. At the south the coast is low and sandy; at the north the plateau reaches to the ocean in occasional steep cliffs, separated by low plains, in one of which lies the picturesque capital of Hadibu (or Tamarida). In winter the climate is very dry, except for showers in the Haghier mountains. In summer the monsoons are accompanied by heavy rains throughout the island.

The geologic history of Socotra is very complex, the island having been at remote epochs connected in turn with the continents of Asia and Africa. All through the repeated rising and submergence of the land, the central peaks have stood above the waters and afforded sanctuary to a varied and curious flora, in which Central African and Asian influences are strongest, with South African and even American relationships intermingled. About a third of all the genera and species present on the island are elsewhere unknown. So distinctive a vegetation has called numerous botanists to its investigation, nearly all men identified with *Stapelia* history, including Balfour, 1880, Schweinfurth, 1881, Theodore Bent, 1897, Forbes and Ogilvie-Grant, 1898-99, and S. Paulay, 1898.

Three *Stapeliads* are known from the island, all endemic: *Caralluma socotrana* from Galonsir (south-east); *C. rosenegrenii*, from the semicircular plain around Hadibu and at the foot of Derafonte Mountain, a spur of the Haghier mountains; and *Edithcolea sordida*, from near Hadibu and the Garieh Plain. An unidentified *Echidnopsis* was also reported from the limestone hills north-west of Galonsir by Prof. Balfour, who believed it might be *E. cereiformis* or a closely allied relative. "This is the only *Stapelioid* plant," he adds, "that is eaten by the inhabitants."

Arabia.

One Stapeliad only is recorded from the northern non-tropical half of the Arabian peninsula. This is *Caralluma aaronis*, discovered on Mount Hor, in the region now separated to form the British mandate of Transjordan. In tropical Arabia, the southern half of the peninsula, the story is very different. Here nearly twenty species are known (though several only imperfectly so), and doubtless many more remain to be discovered, for the explorations of Forskal, Schweinfurth, Aucher-Eloy, Deflers, Hirsch, and Bent and Lunt have done little more than comb the coast line, and since 1900 not a single new species of the tribe has been collected in the whole country.

One can get a rough idea of southern Arabia by holding up one's right hand and spreading thumb and forefinger apart. At the base of the inverted triangle between these fingers is Aden. Along the western side, facing the Red Sea and represented by the thumb, extends the land of Yemen, the Arabia Felix of the ancients. The longer coast line, represented by the forefinger, running north-east and looking southward over the Indian Ocean, is mysterious Hadramaut. The tip of the forefinger abuts in Oman. Between Yemen and Hadramaut, partly along the southern coast around Aden and to the east, partly extending inland, are a number of districts formerly independent of each other, including those known to Deflers and Schweinfurth as Bilad Jafa, Bilad Fodhli and Bilad Awdeli.

The entire V-shaped coastal belt is composed of range on range of hills and mountains, 2,000 to 5,000 feet or more high, which break the sea winds and thereby make a great desert region of the whole interior plains. Among all these hills and mountains are many valleys, some yielding seasonal pasturage, others mere wastes of succulent Euphorbias. Of particular importance botanically is the long range of mountains which is the backbone of Deflers' Bilad Fodhli and of Hadramaut. Deflers likened it to a giant hyphen, connecting the great continental vegetations of Asia and Africa. Certainly at one period or another many a plant migration has left its traces among the mountains and valleys of the region, and here the Stapeliads attained a degree of succulence unknown to them in India.

Perhaps the Stapeliads entered Arabia (from Iran?) across the Gulf of Oman, but the only species recorded from the whole district of Oman is the imperfectly known *Caralluma aucheriana*. Coming through the mountains of Hadramaut towards Aden, the most widespread species is *C. quadrangula*, which covers large tracts on many southern slopes. Other *Carallumas* from Hadramaut include *C. flava* (Wadi Hadiea and Saihut), *C. arabica* (Saihut), and *C. luntii* (Dobaibah). In Bilad Awdeli the Stapeliads have found a congenial resting place on the northern slope of Mt. Nakhai, where they quite displace the thickets of Euphorbias and become the dominant element in the singular flora. Low knolls along the edge of the inland plateau are covered with tufted bushes among which the Stapeliads predominate, including *C. quadrangula*, *C. adenensis* and *C. awdeliana*. In Bilad Fodhli the *Carallumas* are represented by *C. anemoniflora*, *C. chryso-stephana* (Mt. Areys), and *C. subulata*, the latter being the only *Eucaralluma* in Arabia (Wadi Eybad near Schoukra, and other points). Nearest of all to Aden is *C. adenensis*, which enters the peninsula on which the city is situated and is found on the neighboring Mt. Cham-Cham. *C. cicatricosa* also grows on Mt. Cham-Cham, and thence to numerous points in Yemen.

In Hadramaut are found the most northerly of all *Duvalias*, *D. sulcata*, and several

species of *Echidnopsis*: *E. cereiformis* (common from Bilad Fodhli to Yemen), *E. bentii* and *E. scutellata* (Bilad Soubaihi).

From Yemen, *E. cereiformis* crosses the Red Sea to Africa, and a second *Echidnopsis* from Yemen, *E. nubica*, does the same. *Caralluma penicillata* is native to Yemen, while its var. *robusta* is found in Eritrea and the Sudan. It is only a short seed-flight across the Red Sea to Eritrea and the Sudan, and even where a Yemen species does not reappear in Africa unchanged it is always probable that closely related forms will be found, which have developed from the slightly modified environment. Thus the only Arabian *Huernia*, *H. macrocarpa* var. *arabica*, looks across the Red Sea from Hille and Walledjeh to several cousins in Eritrea and the Sudan, and *Caralluma commutata* (believed to be native to Menacha in Yemen) has its nearest relative, *C. sprengeri*, also in Eritrea and the Sudan.

Palestine.

Palestine is the coastal strip in Asia Minor, once inhabited by the Philistines, which separates the north-western extremity of the Arabian peninsula from the Mediterranean. A single Stapeliad, *Caralluma aaronis*, already encountered in Transjordan, reappears in the mountainous country of Judaea near Jerusalem, among the chalk rocks at 2,200 feet elevation.

Sinai Peninsula.

The natural boundary between Asia and Africa would seem to be along the Suez Canal, as a continuation of the Red Sea, and it always comes as a surprise to find that the Sinai Peninsula, east of the Canal, is politically an integral part of Egypt. It extends east from the Canal to the Palestine boundary and south as a peninsula into the Red Sea. It is a barren country of over 25,000 square miles, waterless save for the Wadi Feiran and a few scattered water holes. Only a single species of Stapeliad, *Caralluma sinaica*, has been recorded and its precise habitat is wholly unknown.

Sudan.

The Anglo-Egyptian Sudan is an enormous tract of over a million square miles within the Tropics, extending from Egypt on the north to Kenya Colony (Uganda) and the Belgian Congo on the south, and from the Red Sea, Eritrea and Ethiopia on the east to French Equatorial and West Africa on the west. Almost every possible climatic condition occurs within its limits: the complete aridity of the Sahara Desert in the north-west and of the Libian and Nubian Deserts in the extreme north; the very narrow evergreen strips immediately bordering the Nile north of Khartoum, with occasional rainstorms providing sparse and short-lived grazing in favorable years in the otherwise barren inland Wadis and depressions; the better watered district south from Khartoum as far as Fashoda, in part of which some cultivation of cotton is realized with the aid of canal irrigation, and a large portion of the world's gum Arabic supply produced; and below Fashoda tropical rains and immense solitudes of swamp, rising in the south and south-west to the Congo watershed. Between the complete aridity of the north and the 60-inch annual rains of the south, Stapeliads have a hard time to find conditions to their taste. The authoritative

Flora of the Sudan by A. F. Broun and R. E Massey gives just one record from the southern province of Bahr-el-Ghazal, *Huernia macrocarpa* at Abu Gurun in Jur-land. All other Stapeliad records in the Sudan are from the region between the Nile and the Red Sea in the north-east, in the Kassala Province, which now includes the former Red Sea Province. The chief character of the landscape here consists of countless groups or masses of black or deep red or brown hills of naked rock, rising directly from the intervening sandy or gravel valleys, with sparse vegetation bordering the water-courses which flow for a few days, or at most for a few weeks, each year

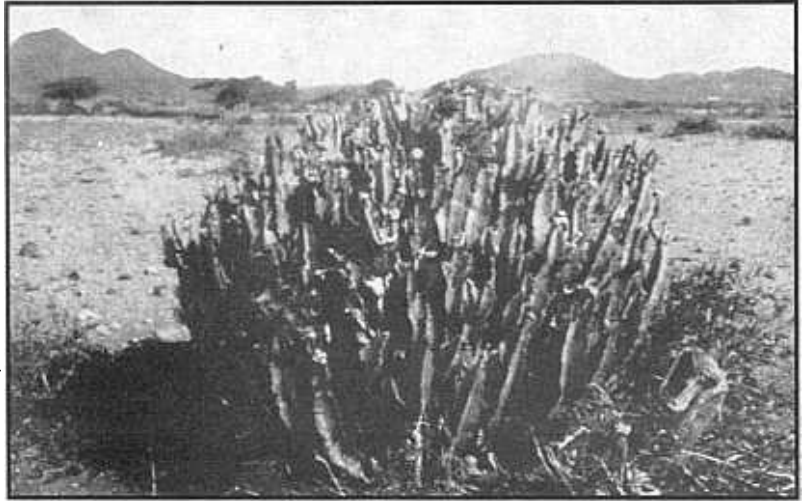


FIG. 10
Caralluma retrospiciens N. E. Brown

Showing a plant in its natural surroundings at Sinkat, Sudan. The white scars at the end of some of the branches are the hard and dried seats of last year's flowers. Several "tennis balls" of this year's flowers may be distinguished at the centre of the clump. Photo by R. J. Darvall, 1935.

during the brief period of rains. Here *Huernia macrocarpa* (or one of its varieties) reappears at Sinkat, 3000 feet above sea-level and about 50 miles inland from the seaport

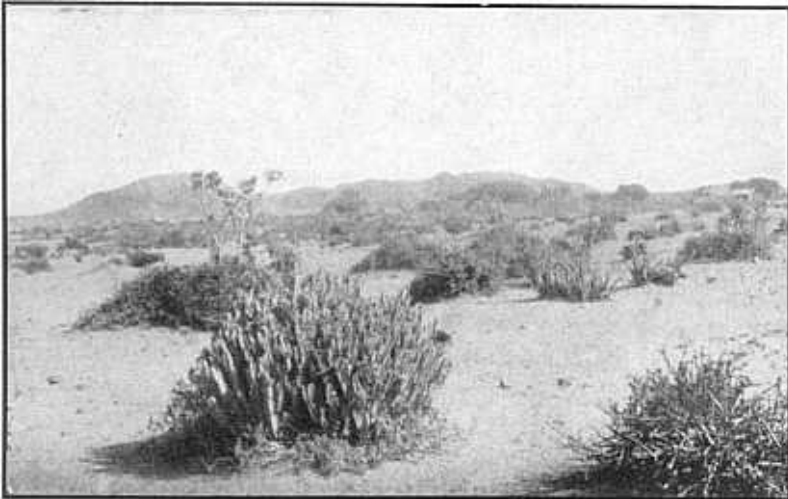


FIG. 11

Scattered desert vegetation at Sinkat, Sudan. A plant of *Caralluma retrospiciens* in centre foreground, with another in rear at right. Photo by R. J. Darvall, 1935.

of Suakin. At Er-kowit, the small area near the edge of the Red Sea escarpment, where sea mists discharge their moisture in the winter and beget a flora of peculiar richness and variety, and on the slopes south-west of Suakin grows *Echidnopsis nubica*, which has crossed the Red Sea from Yemen in southern Arabia. And in many of the valleys of the Red

Sea hills, notably at Sinkat and in the Karora Hills, a prominent feature of the scattered vegetation is furnished by the giant clumps of *Caralluma retrospiciens*. This species extends its habitat out to several of the small islands in the Red Sea, including Dahlac Island and Harnish Island (var. *hirtiflora*). And there are four other *Carallumas*, *C. penicillata* var. *robusta* (Sinkat), *C. longidens* (from Wadi Laëmeb, between Suakin and Berber), *C. sprengeri* (also between Suakin and Berber), and *C. vittata* (in Lat. 21°, without more precise locality).

The Sahara Desert and its confine countries.

The great desert region of the Sahara extends across northern Africa from the Anglo-Egyptian Sudan on the east, to Mauretania and the Rio de Oro on the west. Dr. Maire and Prof. Chevalier consider the Sahara proper as restricted to the territory receiving less than 10 inches of rain per year, or some two million square miles. Around this central region, in which the vegetation, save in a few cases, is negligible, there is a secondary zone with rainfall of 10 to 20 inches, which may be called the confines of the Sahara. On the south this forms a belt about 150 miles wide, known as the Sahelian zone, separating the

desert from the tropical vegetation of the French Sudan. North of the Sahara a similar zone embraces the tablelands and steppes of northern Africa, reaching to the Atlas mountains in Algeria and Morocco and almost to the Mediterranean coast in Tunis and Libia. It is in this intermediate zone around the Sahara that a few Stapeliads, nine species in all, may be found.

In the north, the principal species is *Caralluma europaea*. The type of this species is known only from the Mediterranean islands of Lampedusa and Linosa. Politically these islands belong to Italy, but geologically they mark the edge of the submarine platform which juts out from Tunis into the Mediterranean. *C. europaea* reappears in Libia in the var. *marmaricensis*; then in Tunis and Algeria the var. *simonis* becomes the common form, extending into Morocco, where the var. *maroccana* is also frequent. These varieties are found from the coastal cliffs inland as far as the first mountains of the Sahara plain.

Also near the coast in Algeria is



FIG. 12

Caralluma retrospiciens var. *Tombuctuensis*, comb. nov.
Plant, without flowers, growing among large granite rocks in the valley of the Oued Ilaman, Hoggar district, Algeria, at 6,500 feet elevation. Identification uncertain.

Photo by Dr. R. Maire, 1928.

found *Caralluma munbyana*. Then going south one meets *C. venenosa* and the great clumps of *C. retrospiciens* var. *tombuctuensis*. This species was probably native to what is now the central Sahara at some remote period, when conditions there were more favorable to plant life than they now are. As the desert dried up, the plant must have with-

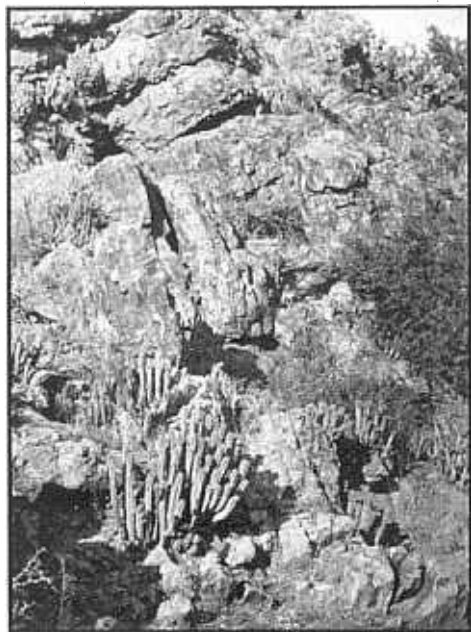


FIG. 13

Caralluma hesperidum Maire

Plant growing at Djebel Ouarzemine, Sous, Morocco, in association with *Euphorbia echinus* and *Acacia gummifera*. Photo by the Gattefossé-Barruel expedition, 1934.

drawn alike to the north and west and south, for to-day it grows not only in the Hoggar district of Algeria, but in the west in Mauretania, and throughout the south in Nigeria and Senegal and the French Sudan.

In Morocco, besides the varieties of *C. europaea*, are recorded *C. hesperidum* (widely distributed near the coast), *C. munbyana* var. *hispanica* (Mount Oudjda) and *C. burchardii* var. *maura* (near Agadir). The type of *C. burchardii* is known only from the island of Fuerteventura in the Canary Islands, about 200 miles off the southernmost tip of Morocco.

Continuing from Morocco to the south, in Rio de Oro, the only Stapeliad recorded is *C. mouretii*, which extends into Mauretania (Tidjikja). In Mauretania, too, is found *Caralluma decaisneana*, whose habitat continues south-east into Senegal and the French Sudan. Throughout this region, which constitutes French West Africa, the only other certain species, besides *Caralluma retrospiciens* var. *tombuctuensis*, is *C. dalzielii*, often transplanted near their homes by the natives to ward off hostile hoodoos from their little plantations of yams.

Spain.

The climate of Spain, now characterized by the rigorous winters of a mountain country, now tempered by the great length of the coast line, is the most varied found in any European land. When one descends from Castilla southward across the Sierra Morena into Andalucia, one enters a subtropical zone of which the warmest section is the extreme south-east angle of the peninsula from the Province of Almeria through Murcia to Alicante. Here on the plains and hill terraces the aspect is distinctly African, with barren steppes, rocky deserts and occasional fertile areas where even palms abound. The flora testifies to the land connection existing in geologic times between Spain and Africa, and it includes a curious diversity of plants whose associations extend from the Canary Islands across northern Africa to Asia Minor. In particular there is a striking xerophytic society in the desert of Dalias in Almeria, where the Sierra de Gata breaks the Mediterranean winds from the east and reduces the rainfall to a few inches in the winter. At Capo de Gata is found the European home of the "European Caralluma," *C. europaea* var. *confusa*, which reappears some 80 miles up the coast near Mazarron in the Province of Murcia.

Due inland, 50 miles from Mazarron, in the heart of the Sierras of Murcia, grows a second *Caralluma*, *C. munbyana* var. *hispanica*. These two plants were evidently among the early invaders from Africa, long centuries before the first Moors came sailing in behind the Berber Tarik, and to-day, when the Moors have long vanished from the land, they remain the only Stapeliads known on the European mainland.

Eritrea, Somaliland and Ethiopia. (By Col. R. E. Drake-Brockman).

East Central Africa, the easternmost tip of the continent, comprises Ethiopia in the interior, with Eritrea and French, British and Italian Somaliland forming coastal strips on the north-east and the south-east.

Eritrea lies along the southerly end of the Red Sea, with a total area of about 60,000 square miles. Then comes French Somaliland, a small district of 10,000 square miles at the gate to the Red Sea. Next follows British Somaliland along the Gulf of Aden, 70,000 square miles, and finally Italian Somaliland, 150,000 square miles, which extends from the tip of the continent at Cape Guardafui for a thousand miles along the Indian Ocean to Kenya. Ethiopia has a total area of some 350,000 square miles, divided into provinces, including Tigré and Shiré, Simen and Amhara in the north, the Galla country in the centre and south, and Ethiopian Somaliland in the east.

The geological formation of the regions included in East Central Africa is more or less similar. It extends from the Red Sea coast of the Kassala Province in the Sudan in the north to Cape Guardafui, and thence westwards into the highlands of Ethiopia in the interior.

On landing anywhere along this coast of the Red Sea and Gulf of Aden, the traveler finds himself on a maritime plain, chiefly composed of old coral reefs with occasional breaks where the vegetation is invariably denser owing to the presence of fresh water passing below the surface from the maritime hills. This maritime belt, the only section which has been under the sea, gradually rises into the foothills until an irregular range of mountains is reached lying within 40 or 50 miles of the seaboard. These mountains rarely exceed a height of 6,000 feet. They run more or less parallel to the coast and rise abruptly from the coastal belt. On climbing them one reaches a plateau some 3,000 to 4,000 feet above the sea-level. It is an unbroken plain, covered by luxuriant grasses and acacia bush, extending for many miles until the high plateaus of Ethiopia are reached. In the eastern parts of Ethiopia, the plateaus of Harrar and Arusi, rolling grassy plains broken by great rifts which give rise to numerous perennial streams, vary in altitude from 6,000 to 8,000 feet. Further west, in the centre of the country, the Shoa plateau has an elevation of 9,000 feet. To the north of this are rugged mountainous regions where the highest peaks, 12,000 to over 15,000 feet high, are snow-clad for the greater part of the year. In the north the Ethiopian highlands come to an almost abrupt termination and fall away to the low-lying regions of the Sudan; in the south and south-east the fall is gradual through the Galla country until the coastal plains of Italian Somaliland and Kenya are reached.

The grass and acacia bush plain, known as Ogo in British Somaliland, extends southwards without interruption through Italian Somaliland to Kenya, where it is known

as Nyika. The soil is sandy and porous, and sometimes bright red owing to an admixture of oxide of iron. With one or two exceptions the river-beds during most of the year only contain pools of water at a few favored spots. Then in the rainy season the rivers come down in flood for a few days, only to revert immediately to their dry courses. Some of the grasses in this vast plain are especially valuable for their ability to withstand the longest droughts. Many succulents flourish, too, including the STAPELIEAE, together with aloes and two species of *Sansevieria*, while Myrrh, Frankincense, gum and bdellium-producing trees thrive here and on the sun-baked maritime hills and mountains. The higher peaks and mountain ranges are all volcanic in origin and it is among these, where the plateaus are probably formed of volcanic material, that the soil is most fertile and the climate most bracing with a regular rainfall.

From the maritime belt to the snowline on the highest peaks some eight or nine distinct floras are found, from the typically tropical to the alpine just below the snowline. Stapeliads are found from low altitudes to above 7,000 feet.

In Eritrea, the most conspicuous species is *Caralluma retrospiciens*, which was first collected on the islands of the Dahlac archipelago in the Red Sea, which belong to Eritrea. It occurs also on the mainland. A large-flowered variety, var. *hirtiflora*, is from Saati. Another giant, *C. penicillata* var. *robusta*, grows at Acrur, 6,000 feet, and in the Arrot Valley, south of Aideroso, 4,300 feet. The type of this species is native to southern Arabia, across the Red Sea. *Echidnopsis nubica* and *E. cereiformis* occur on both sides of the Red Sea, being recorded in Eritrea from Geleb and other points. *E. dammanniana* is a third *Echidnopsis* from Geleb, but is unknown in Arabia. Between Geleb and Keren is the most desert portion of the inland plateau in Eritrea and the centre of the succulent vegetation. At Keren are found *Caralluma anga* (?) on Deban Mountain at 5,000 feet, and *Huernia macrocarpa* var. *penzigii*, while the type of *H. macrocarpa* and the var. *schweinfurthii* were collected at Acrur. Other Stapeliads in Eritrea include *H. concinna* (?), *Caralluma sprengeri* (near Kohaito), *C. dicapuae* (Naro and other points) and *C. baldratii* (near Asmara, 7,000 feet).

No Stapeliads have been recorded from French Somaliland. In British Somaliland *C. retrospiciens* is the most conspicuous species, near Berbera and in many other localities. The remarkable *Edithcolea grandis* has its most northerly habitat in the Henweina Valley, just north of the Golis range in the heart of the country. *Drakebrockmania crassa* grows near Odweina, due west from Burao. Five other species are recorded without precise localities: *Caralluma edithae*, *C. corrugata*, *Echidnopsis somalensis*, *Huernia concinna* and *H. somalica*.

In Italian Somaliland the records have been principally from the south. At the southern extremity of the colony, near Afmadu below the river Juba, grows *Caralluma oxydonta*. *Edithcolea grandis* reappears in rocky places by the river Dawa. Three more *Carallumas* are found near the capital city of Mogadoxo, *C. mogadoxensis*, *C. speciosa* and *C. somalica*. Further north, in the Sultanate of Obbia, is the habitat of *C. rivae*, between Bihlelli and Mt. Ilbehla. *Echidnopsis cereiformis* grows in dry chalky soil near Passo di Cavernan.

The dry highlands of Ethiopia probably harbor many more Stapeliads than have yet been identified. The only species believed to be endemic is *Caralluma sacculata*, from the south. All others have already been noted from Eritrea or Somaliland. They are the following: *Caralluma retrospiciens*, frequent at Milmil and other points; *C. sprengeri*, near Adowa in the extreme north; *C. anga* and *Huernia macrocarpa*, both in the province

of Shiré, the latter also in Simen; *Caralluma rivaie*, in Ogaden, in the eastern part of Ethiopian Somaliland; and *Echidnopsis cereiformis*, near Dschedscha.

Kenya.

The English colony of Kenya in East Africa derives its name from Mt. Kenya, the lofty mountain whose glaciers look down upon the Equator. Kenya has an area of 250,000 square miles. It is a land of many mountains. They begin at the southern boundary, where Kilimanjaro towers across the border in neighboring Tanganyika, and extend past the capital, Nairobi, then past Mt. Elgon in the centre of the country, to Uganda in the north-west. Many parts of the Colony, especially the lower lands in the north and north-east, are still imperfectly explored botanically.

While the climate is wholly tropical below the altitude of Nairobi (5,400 feet), it becomes rapidly cooler and drier at higher elevations and there is an intermediate zone around 6,000 feet, where succulents grow favorably wherever the soil is rocky and dry. In such areas grow "*Stapelias* of several sorts, with their odd stars, in some cases very beautiful and in others rather repellent" (Lady Muriel Jex-Blake). They are often found in volcanic dust and lava. "They probably occur on all mountains. They are plentiful around Machakos district and Donyo Sabuk, that humped mountain 40 miles east of Nairobi, along the rift valley escarpment and in the rift valley around Naivasha, and doubtless in many other districts" (Mrs. E. R. Molony).

Among other species found in the colony, several of which are still unidentified, the remarkable *Edithcolea grandis* is frequent in the Wakamba country, near the Athi River below Donyo Sabuk. *Huernia keniensis* grows on volcanic soil on Mt. Kenya and all along the edge of the rift valley, and is recorded from a single rocky outcrop on Mt. Elgon. The var. *molonyae* is sometimes found with the type. *Caralluma gracilipes* is recorded from Kitui in Ukamba, and *C. retrospiciens* var. *glabra* from Witu, and it doubtless grows at other points. It is uncertain whether the type of *C. retrospiciens* is found in the colony. *Stapelia dummeri* is common at the foot of the Mea hills and at Kanam on the Kavirondo Gulf. *S. semota* and *S. molonyae* are found near Nairobi, and there is an unidentified *Stapelia* near Kitale.

The rainfall in Kenya is very irregular, and the flowering periods for all Stapeliads equally so. "An apparently dormant plant," writes Mrs. Molony, "receives one shower of rain and hastily makes the effort to reproduce itself, regardless of size or age, knowing full well that this may be the only shower for many months, just as it may be the first downpour of a three months' rainfall."

Tanganyika.

Tanganyika lies between Kenya on the north and Portuguese East Africa on the south, with a coast line of 500 miles along the Indian Ocean. It is a vast tropical country, of 350,000 square miles, offering limited foothold to succulent plants. Altitudes rise from sea-level to about 6,000 feet, while the mountains of the north-east and south-west attain much greater heights, notably the famous Kilimanjaro, 19,300 feet. Much of the territory is fertile, the highlands of the south-west being a counterpart of the magnificent uplands of Kenya. The most sterile regions occur in the large central plateaus and in

the broken plateaus in the mountainous country of the north-east, and it is there and in occasional areas on the mountain slopes that Stapeliads may best be looked for. Up to the present time only six species have been identified.

An *Echidnopsis*, *E. virchowii*, grows near the sea coast, somewhat inland from the important port of Tanga. Continuing inland towards Kilimanjaro, between the Pare Hills and the Kenya boundary, three *Carallumas* have been recorded, *C. codonoides*, *C. gracilipes* and *C. priogonium*, near Makanya, Gonja and Kihurio. Two *Stapelias* also are known, *S. dummeri* from the Pare Hills, and *S. semota*, from near Kondoia.

Nyasaland.

The British Protectorate of Nyasaland is a narrow strip lying on the west side of Lake Nyasa, between the Lake and Northern Rhodesia and continuing down like a wedge for 200 miles into Portuguese East Africa. The land surface of 37,000 square miles combines tracts at low elevations (Lake Nyasa is about 1650 feet) with a series of plateaus and highlands up to 7,000 feet. For a tropical country, the climate is pleasant in the uplands. From May to August the weather is dry, cool and bracing; the hot months of September, October and November precede the rainy season (December to April) during which the rainfall varies from 25 to 100 inches in different sections. Two Stapeliads are recorded: *Huernia schneideriana*, which grows near Kimbila at the north end of Lake Nyasa, and *Caralluma caudata*, which has the most northerly station of its wide range at Namasi.



FIG. 14

Caralluma codonoides K. Schumann
Photo by P. R. O. Bally of a plant in its natural surroundings near Kihurio, Tanganyika.

The Belgian Congo.

The Belgian Congo, situated west of Tanganyika, is the land of Stanley's "great rain forest," a country seemingly little adapted to the growth of any Stapeliad. But in the southern part, as the elevation increases and one approaches the province of Katanga, a land rich in copper and other minerals, the climate improves and the winters at least are dry and healthy. One Stapeliad has been discovered at 2800 feet elevation at Nswiwa, in Itande, *Caralluma schweinfurthii*, the furthest outlier of the "Ango group."

Angola.

This large Portuguese colony of over half a million square miles lies just north of South West Africa. The entire country is within the tropics, but the seaboard is refreshed nearly all the year by the Antarctic current and much of the interior consists of high plains, well watered and in the southern portion temperate in climate. The annual rainfall at altitudes between 2,000 and 4,000 feet averages 50 inches and occurs mostly in

summer, from September to April. The driest part of Angola is in the south-west corner, near Mossamedes, where the desert coastal strip, with a yearly rainfall under 5 inches, which continues south through South West Africa, begins a little below the city of Benguela. Behind this "thirsty country," an irregular semi-desert belt, conspicuous for its baobab trees, forms a modified extension of the South African Karroid areas. This extends from the Cunene in the south to the basin of the Congo River in the north. In the south, at the great escarpment of the Serra da Chella, where Welwitsch collected plants three quarters of a century ago, the baobab belt is narrow, but in the interior of Luanda and Ambriz it is a hundred miles wide. It is in such arid and semi-arid regions, south of the Cuanza River, among dry rocks and waterless scrub, that the Stapeliads are principally found. Only seven species are recorded. Two *Hoodias* inhabit the very dry south-west coastal desert, south from Lobito Bay, which is about $12^{\circ} 30'$ south latitude. *H. currori* is the more widely distributed, from Elephant Bay to Benguela, and some 20 miles inland to Lengue on the Catanga-Lobito Railway line at an altitude of about 250 feet. *H. parviflora* has its habitat from Mossamedes to Cavalheiros, among elevated rocks near Pomangala, 1,500 feet, and in dry places before Quitibe de Baixo. Curiously enough, no *Trichocaulons* have been recorded from Angola. *Tavaresia angolensis* is widely dispersed further north, between Luanda and Ambriz, but it is by no means plentiful, selecting the sandy clay of dry maritime meadows. It is found within the city limits of Luanda, and used to grow on the compound of the American Presbyterian Mission, before the ground was employed for building purposes. *Carallumas* are rare and very inconspicuous in their natural surroundings, particularly in the dry season. Their northern limit is about 14° south latitude, and none are found in the coastal desert. *C. gossweileri* grows in scrub-covered rocky ground near the old Forte Princeza Amelia at 4,000 feet elevation at Cubango, the region between the headwaters of the Cubango and Cunene rivers. *C. huillensis* is restricted to the neighborhood of Huilla. The type locality of the imperfectly known *Huernia similis* is at Pungo Andongo, in clefts of rocks on mountain slopes of the Praesidium near Cabondo and Catete. Another *Huernia*, *H. volkartii*, was collected near Vila Nova de Seles in the Cuanza Sul country, about 250 miles inland and north of the Lobito-Catanga railroad. It is the least conspicuous of the few succulents which live there in the crevices of the huge granite rocks at 3,500 feet elevation.

South West Africa.

South West Africa embraces nearly 325,000 square miles, extending from Angola south to the Orange River, and from the Atlantic inland to the Bechuanaland Protectorate and British Bechuanaland. The coast-line, about 850 miles in length, is bordered by a low belt of dunes and desert about 30 or 40 miles wide, known as the Namib desert. The rainfall here is very low, in places less than one inch per year, moisture being supplied by the heavy sea-fogs. Inland from the coast one comes upon a series of long mountain ranges, with many peaks between 7,000 and 8,300 feet high. These constitute the westerly escarpment of the great Kalahari plateau. Many of the mountains harbor colonies of Stapeliads, including the Klinghardt mountains and the Great and Little Karas mountains in Great Namaqualand, and the Auas range, south of Windhoek, which

virtually forms the watershed of the country, as a majority of the large rivers have their sources there. Much of the eastern part of South West Africa consists of broad open grass plains, typical of the Kalahari. These plains are at an elevation of nearly 6,000 feet beyond the Auas mountains, and descend to about 2,000 feet as the Cunene and Okavango rivers are approached in the north and the Orange River in the south. Ovamboland, in the extreme north, is a region containing several low swampy salt pans, of which the Etosha Pan is the largest and most famous. Rainfall is the highest in the country, between 20 and 30 inches annually, and the land is adapted to pasturage and some agriculture. Proceeding south through Hereroland, one comes to the capital city of Windhoek, a little north of the tropic. This section has a rainfall averaging 15 inches a year, with much pastoral land. Below the tropic begins Great Namaqualand, extending south to the Orange River, across which lies Little Namaqualand in the Cape Province. This is mainly sheep farming country, with a rainfall averaging only about six inches. Nearly sixty species of Stapeliads are recorded from South West Africa, of which Dr. Paul Range enumerates forty as occurring in Great Namaqualand (Flora des Namalandes, in Fedde's Repertorium, 1935):

- Caralluma armata* - Great Namaqualand: Wittsand; etc.;
- Caralluma hottentotorum* var. *major* - Great Namaqualand: near Aus;
- Caralluma lateritia* (?) - Kuibis;
- Caralluma longicuspis*;
- Caralluma lugardi* - widely distributed in the tropical sections: Windhoek; Omaruru; Rehoboth; Okahandja; Tsubgaris; etc.; and south to Keetmanshoop;
- Caralluma nebrownii* - widely distributed in the tropical sections: from Windhoek north to the Etosha Pan and Ovamboland;
- Caralluma nebrownii* var. *pseudo-nebrownii* - frequent below the tropic, in central and southern sections of Great Namaqualand;
- Caralluma peschii* - Hereroland: Omaruru;
- Caralluma rangeana* - Great Namaqualand: west side of the Klein Karas mountains; Kuibis; Kanus; etc.;
- Caralluma vaga* - Ovamboland: near Olukonda, north of the Etosha Pan;
- Caralluma wilfriedi* - Great Namaqualand: granite formation near Aus and Kubub;
- Caralluma winkleri* - Great Namaqualand: Klinghardt mountains; etc.;
- Duvalia maculata* (?) - Great Namaqualand: near Aus;
- Duvalia polita* - frequent from Otavi to the Auas mountains;
- Duvalia pubescens* - Great Namaqualand: near Aus;
- Echidnopsis atlantica* - from the centre of the Klinghardt mountains;



FIG. 15

Drawing of a *Hoodia* in natural surroundings, made by Mr. Chapman in Hereroland, South West Africa.

From Gardeners' Chronicle, 1873.

- Hoodia bainii* - Great Namaqualand: Warmbad;
Hoodia currouri - Hereroland: Usakos; etc.;
Hoodia dinteri (?) - 130 miles east of Windhoek, near Wit Vlei;
Hoodia gordonii - from Kanus, through Great Namaqualand to the Orange River;
Hoodia juttae - Great Namaqualand: Klein Karas mountains;
Hoodia lugardi - Great Namaqualand: Kuibis;
Hoodia macrantha - Hereroland: Usakos; Onguati; etc.;
Hoodia ruschii - Great Namaqualand: Tiras mountains, 20 miles north of Aus;
Hoodia similis;
Hoodia triebneri;
Hoodia whitesloaneana - Great Namaqualand: Gurub-Tschamis, on the Kuankib;
Hoodiopsis triebneri - Great Namaqualand;
Huernia oculata - Hereroland: between Omaruru and Orumbo;
Huernia zebrina - Great Namaqualand: eastern slope of the Us River, 25 miles north of Kanus station in the Great Karas mountains;
Huerniopsis decipiens - Okahandja; near Windhoek; Khomas mountains; Kubub; etc.;
Piarranthus pulcher var. *nebrounii* - Great Namaqualand: Klein Karas mountains;
Stapelia albocastanea - Great Namaqualand: near Kanus; Maltahöhe; Narudas Sud; etc.;
Stapelia ausana - Great Namaqualand: near Aus;
Stapelia bergeriana - Great Namaqualand;

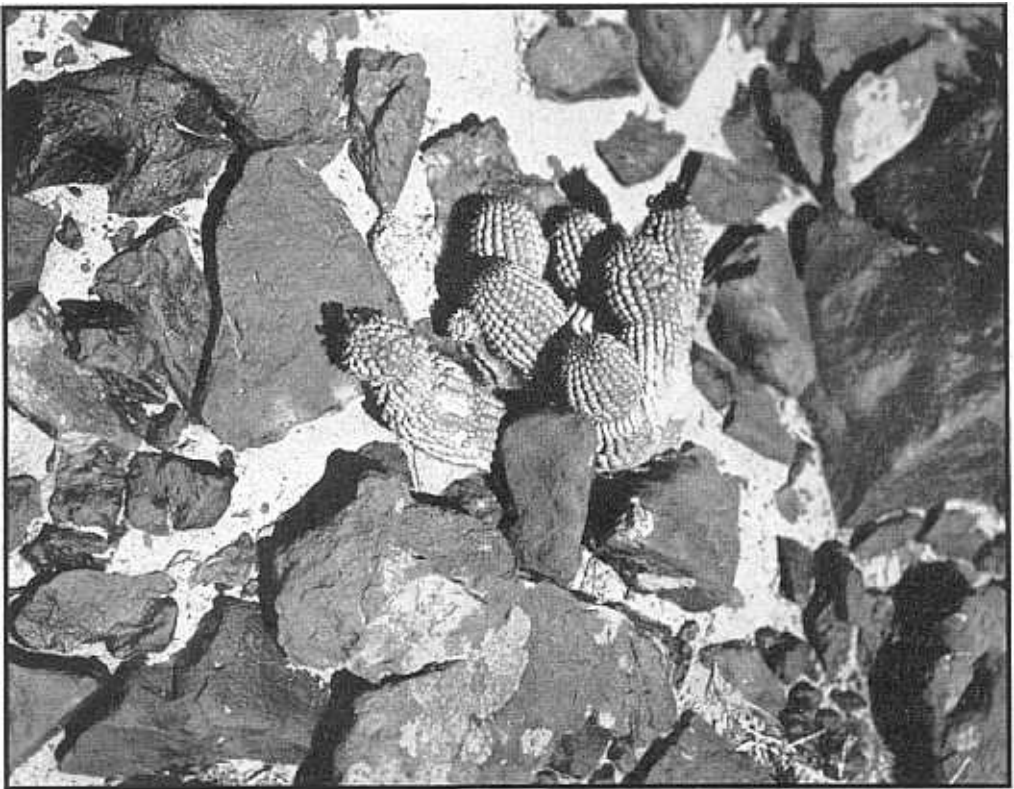


FIG. 16

Trichocaulon pedicellatum Schinz

Photo by G. C. Nel of a plant in natural surroundings at Cape Cross, about 100 miles north of Walvis Bay, South West Africa.

Stapelia dinteri - Great Namaqualand: Klein Karas mountains;

Stapelia flavopurpurea var. *fleckii* - frequent in south and extending north to a little above the tropic;

Stapelia juttae - Great Namaqualand: near Aus and Kanus; Warmbad;

Stapelia kwebensis var. *longipedicellata* - frequent in tropical sections, near Omaruru; and south to Great Namaqualand: Keetmanshoop; etc.;

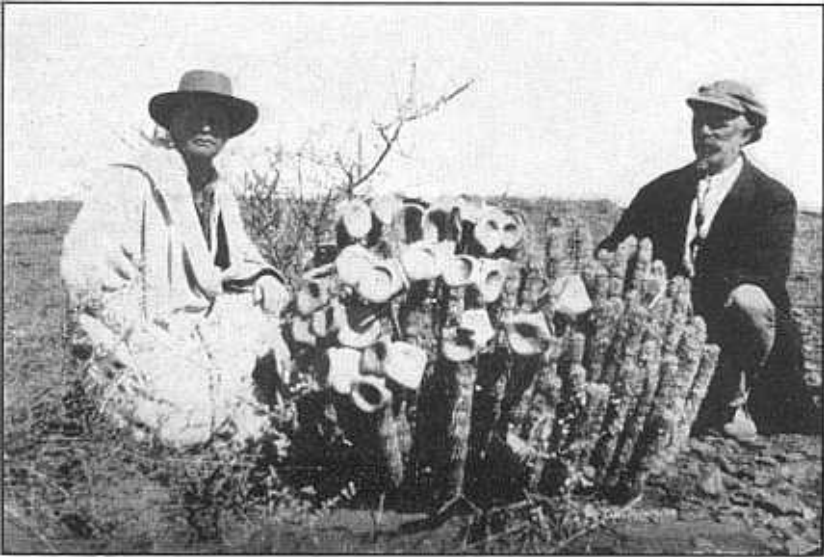


FIG. 17

Mr. and Mrs. Ernst Rusch. Photo taken near Maltahöhe, South West Africa, 1926, and reproduced from *Succulenta*, 1932. The plant is probably *Hoodia gordonii*.

Stapelia longipes - near Witputs;

Stapelia marientalensis - Mariental;

Stapelia pachyrrhiza - Great Namaqualand: Buchberge; etc.;

Stapelia pearsonii - Great Namaqualand: Great Karas mountains;

Stapelia portae-taurinae - Bull's Pass; Aus;

Stapelia ruschiana - Great Namaqualand: Klinghardt mountains;

Stapelia schinzii - frequent from Hereroland to Great Namaqualand;

Tavaresia grandiflora - frequent in Hereroland: Otavi; Omaruru; Tsumeb; etc.;

Trichocaulon cactiforme - Great Namaqualand: Arasab River, south of Kubub;

Trichocaulon delaetianum - Great Namaqualand: Klinghardt mountains;

Trichocaulon dinteri - 50 miles east of Swakopmund;

Trichocaulon engleri - Great Namaqualand: Klein Karas mountains; near Kanus; etc.;

Trichocaulon halenbergense - Great Namaqualand: on the hills above Halenberg station; etc.;

Trichocaulon karasmontanum - Great Namaqualand: near Ussisschlucht in Klein Karas mountains;

Trichocaulon keetmanshoopense - Great Namaqualand: between Keetmanshoop and Aub; near Kanus;

Trichocaulon marlothii - Namib desert; Auas mountains; Modderfontein;

Trichocaulon meloforme - Great Namaqualand: near Aus; pass leading down to Gründoorn;

Trichocaulon officinale - Great Namaqualand: Bethany; Nomtsas;

Trichocaulon pedicellatum - western Hereroland: probably near Hope Mine; Roessing, Cape Cross;

Trichocaulon perlatum - Great Namaqualand: Klinghardt mountains;
Trichocaulon piliferum - Great Namaqualand: Arasab River;
Trichocaulon pubiflorum - Great Namaqualand: east of Warmbad, near Vellor
Trichocaulon sinus-lüderitzii - near Lüderitz Bay;
Trichocaulon triebneri - Okandu; Swakop.

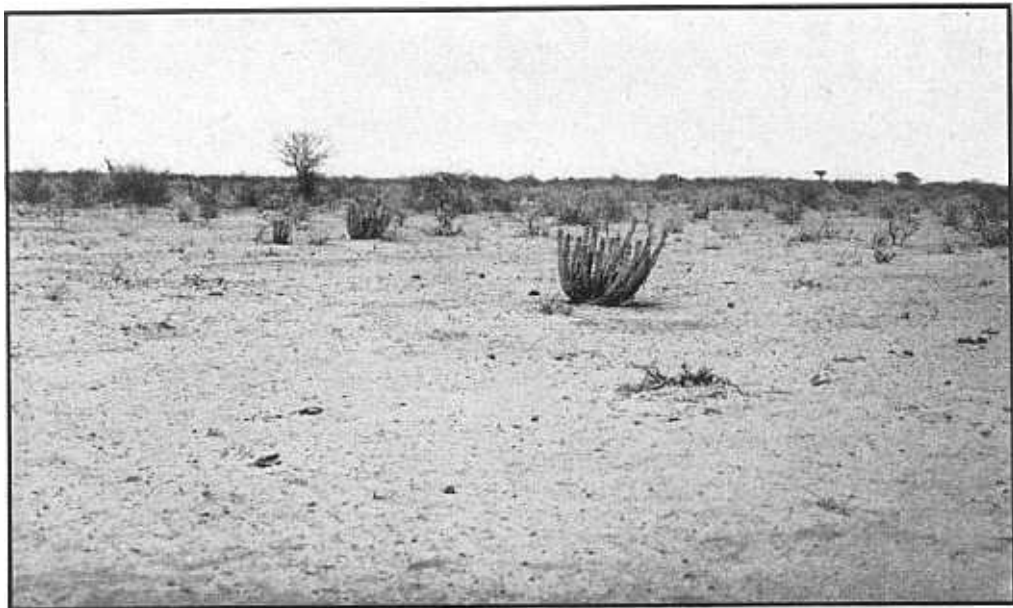


FIG. 18

Large *Hoodias* in their natural surroundings near Lelhakane in the Bechuanaland Protectorate, about 120 miles west of Serowe.

Photo by G. C. Nel.

Bechuanaland Protectorate.

One must not confuse the territory of the Bechuanaland Protectorate with British Bechuanaland, the northernmost section of the Cape Province, south of the Molopo River. The Protectorate extends north from the Molopo over 500 miles to the Zambesi. Between the Transvaal and Southern Rhodesia on the east and South West Africa on the west, it occupies the centre of a vast tableland, with a mean elevation of 3,500 feet. The tropic crosses the country about 50 miles north of Molepolole. The total area is around 225,000 square miles, much of it undulating hilly land with a gradual slope towards the west. The easterly section, especially the south-east, is pastoral country, the summer rainfall (20 to 30 inches) being too uncertain for agriculture. The winters are wholly dry and bracing. To the west and north, the country consists of acacia thorn scrub and grass, with a much lower rainfall. The Kalahari Desert, in the west, is mainly arid, the land covered with dense bush. In the north are several large depressions, which become great lakes at the rare seasons of heavy rains and at other times are reduced to dry marshes or salt pans. Such are Lake Ngami in Ngamiland, the great Makarikari Lake in the north-east and the swamps of the Okavango basin in the extreme north. Botanically the Protectorate remains only partially explored. The expeditions of Baines, Schinz,

the Lugards and Vernay-Lang have revealed evidence of the richness and interest of the Stapeliads wherever conditions are favorable for succulents in the north and west; while the collections made by the Knobels from Molepolole, extending 150 miles west, 50 miles south and 90 miles north, indicate that Stapeliads are equally plentiful in the south-east, although represented by a somewhat different array of species.

The species so far known only from the south-eastern section include *Caralluma knobelii* (Kalahari south and west of Molepolole), *C. rogersii* (Mahalapye, 100 miles north-east of Molepolole; and Boatlaname, 70 miles north), *Stapelia gettleffii* (Boatlaname), *Stultitia tapscottii* (Molepolole and Mochudi), and *Huernia longituba*, *Huerniopsis decipiens*, *Stapelia nobilis* and *Tavaresia grandiflora* (all near Molepolole). *Huernia zebrina* is recorded near Serowe.

The species exclusively northern or western are *Caralluma lateritia* (Botletle Flats), *C. lugardi* (Totin near Lake Ngami), *C. vansonii* (Nkate on the Nata River), *Hoodia lugardi* (Chukutsa Salt Pan), *Huernia bicampanulata* (without locality), *Stapelia kwebensis* (Kwebe Hills, near Lake Ngami), and *S. schinzii* (near Lake Ngami).

A few species are known from both sections: *Caralluma maculata* (T'Klakane Pits in the north and Boatlaname in the south-east), *Huerniopsis atrosanguinea*, *Duvalia polita* (or the variety *transvaalensis*) and *Caralluma lutea*. Mr. Knobel records the latter from between Zeerust, Transvaal, and Molepolole, while Dr. Schönland writes us he found it in northern Kalahari about 50 miles north-west of Serowe, on the road to Lake Ngami, and he identifies it plausibly with the evil-smelling plant of Major Lugard's anecdote, narrated on p. 124.



FIG. 19

A large *Hoodia* in natural surroundings, near Lelihakane in the Bechuanaland Protectorate, about 120 miles west of Serowe.

Photo by G. C. Nel.

Northern Rhodesia.

Up to a very recent date virtually nothing was known of the Stapeliads inhabiting the thousand miles which separate the northern half of Tanganyika from the Transvaal. Even to-day no records have been published of any species from the quarter million square miles of Northern Rhodesia. Yet undoubtedly many are to be found. Indeed we have received several informal records full of promise for the time when a more complete survey can be made. Sydney Tapscott of Broken Hill reports two species in the neighbor-

hood of that place, a *Huernia* from the granite boulders near Broken Hill (probably *H. levyi*) and a *Stapelia* of the *nobilis* type. Frank W. Porter has collected along the Railway line running through the centre of the country. He makes the interesting observation that all the Stapeliads he has seen were growing under, or very near to, a tree called the "Mopane." Wherever this tree grows it is a sign of very poor farming and grazing land,



FIG. 20

Three species of Stapeliads growing socially together under an acacia, near Serowe in the Bechuanaland Protectorate. A *Huernia* and a *Caralluma* are clearly visible. A third smaller species is concealed among the leaves in the foreground. Photo by G. C. Nel.

there being frequent patches of "brak," or bare ground, amongst the trees. At Livingstone Mr. Porter collected a *Huernia* of the *H. kirkii* type, which occurs from Choma, Northern Rhodesia, right down to Wankie in Southern Rhodesia. At Lueze he found a *Caralluma* of the *C. lateritia* type, besides a large-stemmed form of *Duvalia polita* and the aforementioned *Huernia*. At Sikalongo, 10 miles north of Choma, he found a small Stapeliad, as yet unidentified.

Southern Rhodesia.

Conditions for Stapeliads in Southern Rhodesia are extremely favorable, but the species from this great country have only recently begun to be known. Extending from the Zambesi south to the Limpopo River, the area of Southern Rhodesia is over 150,000 square miles, consisting sometimes of well wooded ranges of hills and isolated kopjes, but more generally of Savanna or bush country, wide grassy plains treeless or alternating with woodland. The altitude of the plateau varies from 3,000 to 5,000 feet, and the low-lying valleys of the rivers descend to as little as 1,600 feet. Most of the Stapeliads found on the western side of the country have been collected below 2,500 feet. Rainfall throughout Southern Rhodesia comes in the summer, and is very varying in amount. On the west and south it averages about 17 inches. Around Bulawayo and northern Matabeleland it is about 30 inches, and in Gazaland, on the Mozambique border, it is over 40 inches. Salisbury and Mashonoland in general have a heavier and earlier and more evenly distributed rainfall than Matabeleland or the Wankie district, in which latter as little as ten inches a year has been known. This part of the country is subject to violent downpours, which cause most of the precipitation to be carried off by the rivers and do not benefit the humidity of the soil proportionately to the amount of rain that has fallen. Large areas of the country are covered with Kalahari sand, with an underlay of basalt hundreds of feet in thickness, which is laid bare in the valleys by water erosion. Matabeleland and Mashonoland have large areas of granite and kindred rocks, and running almost right across the country is a dyke of platinum bearing rock, together with many gold bearing quartzite veins.

Much of Southern Rhodesia has not been prospected for plants other than forest trees, and a wide field is still left open to the Stapelia collector. The earliest species was discovered by Dr. Marloth in 1908 in the Matopo Hills in the Bulawayo district (*Stapelia marlothii*). Probably the whole country around Bulawayo will prove a very rich hunting ground. Already within a radius of ten miles around the city of Bulawayo have been collected *Duvalia polita*, *Huernia kirkii*, a *Stapelia* of the *nobilis* type, *Caralluma melanantha* and two other unidentified *Carallumas*. The most frequent species in the easterly half of the country is *Huernia hislopii*. It is found on kopjes around Salisbury, thence south to the hills between Umvuma and Fort Victoria, and east past the Zimbabwe ruins to the waterless Sabi River Valley near the frontier of Portuguese East Africa. The rainfall in the lower Sabi Valley averages 9 inches annually and the maximum shade temperature is 120°. *Huernia verekeri* also grows in the Sabi Valley, but is much rarer. There are at least three other Stapeliads in the region, according to Mr. Vereker, one of which is probably *Caralluma rogersii*. Near Salisbury grows *Stapelia youngii*, a small-flowered relative of *S. gigantea*. From Chibi, in the south-east section, has come the var. *chibensis* of *Caralluma caudata*, and other varieties of the species are also native in the country.

The finest field for Stapeliads in the two Rhodesias may prove to be the zone east from Victoria Falls to Wankie. The Wankie district is mainly of sandstone formation, with deposits of fire clay and shale. The Mopane tree, mentioned in speaking of Northern Rhodesia, flourishes here, and with it many Stapeliads. Near Wankie, B. Levy has collected *Tavaresia grandiflora*, *Huernia levyi*, *H. verekeri*, a *Stapelia* of the *nobilis* type, *Caralluma maculata*, *C. piaranthoides* and a close relative of *C. lugardi*, differing in the form of the corona-lobes; and from Matetsi, Capt. R. H. R. Stevenson has reported *C. lateritia* var. *stevensonii*, *C. piaranthoides* and *H. verekeri* var. *stevensonii*.

Portuguese East Africa (Mozambique.)

Portuguese East Africa (Mozambique) occupies the east coast of Africa from Tanganyika to Natal. It has an area of 30,000 square miles, with a coast line of 1,400 miles, near the southern end of which begins the sub-tropical East Coast forest. The country runs inland for varying distances, from 40 miles in the south to about 450 miles in Portuguese Nyassa in the north, and elevations rise fairly rapidly from the coastal plateau to the level of the tropical savanna, paralleling Rhodesia, and the eastern savanna, paralleling the Transvaal. The highest altitude (on Monte Namuli) is about 9,000 feet. Rainfall is concentrated in the summer, reaching 40 to 60 inches in parts of Portuguese Nyassa and the Milange and Gurué countries. In the south the rainfall is 20 to 25 inches. The winters are almost wholly dry. One would expect the high tableland to be well adapted to Stapeliads, wherever rocky outcrops or hill slopes are present, and some species along with succulents of other families have been recorded near the coastal plain and even from some of the low river valleys. Undoubtedly many species from neighboring countries, from the Sabi River valley of Southern Rhodesia, the Barberton district of the Transvaal, or the mountains of Swaziland and Zululand, will also be found in Mozambique. Indeed Prof. G. C. Nel, who recently collected between the Transvaal border at Komatipoort and the capital city of Lourenço Marques, crossing the Lebombo range, writes: "I found more Stapeliads than I ever dreamt of." However, of some ten species collected, only one, *Duvalia polita*, has yet flowered or been identified. The species hitherto known have been collected by Mrs. J. J. Monteiro, about 1885, and in the last few years by Prof. Antonio de Figueiredo Gomes e Sousa, of the Department of Agriculture at Lourenço Marques, and Dr. Antonio Roche da Torre at Alto Rovuma.



FIG. 21

Showing the profuse formation of roots in its native loose black soil of the *Stapelia* in Fig. 22.

Photo by G. C. Nel.

- Caralluma lutea* - Mangulane, 55 miles west of Delagoa Bay, 150 feet elevation;
- Caralluma melanantha* var. *sousae* - Mangulane;
- Caralluma longecornuta* Croizat, ex Gomes e Sousa, Moçambique, 44. 1935. nom. nud. perhaps related to *C. caudata* - Mandimba, Portuguese Nyassa, 2,500 feet;
- Duvalia polita* - Massengiri, on Olifants River in Lebombo Mountains;
- Huernia hystrix* - Mangulane;
- Huernia schneideriana* - Mangulane; (?) Macaloge, Portuguese Nyassa;
- Stapelia longidens* - endemic near Delagoa Bay;



FIG. 22

Stapelia of the *nobilis-gigantea* type, in natural surroundings near Moamba, Portuguese East Africa. The country is fairly open, with thorn scrub and scattered trees. Photo by G. C. Nel.

Stapelia gigantea - Mangulane;

The report of a *Trichocaulon* (?) sp., near Rovuma River, Macaloge, is unconfirmed.

Madagascar.

The island of Madagascar lies off the east coast of Africa, opposite Portuguese East Africa. It is 1,000 miles in length, with a maximum width of 250 miles. The interior of the island is a great grass-covered plateau of 3,500 to 4,000 feet elevation, with occas-

ional mountains of twice that altitude. This central plateau is surrounded by wooded or scrub coastal regions sloping irregularly to the sea. The different exposures on different sides of the island, combined with the varied effects of the seasonal winds, produce a variable climate. The southern province of Androy, a little below the tropic, is the driest part of the island, the annual rains aggregating 15 to 25 inches, and around Ambovombé in the heart of this section the rainfall is much reduced. Summer showers are short and violent, winter rains very scanty; fogs prevail at night and dews are heavy. These elements have resulted in a belt of succulent scrub vegetation along the entire south end of the island, and it is here, between Ambovombé and Fort Dauphin, that three Stapeliads have been discovered by Raymond Decary, the only ones known from the island, *Stapelianthus decaryi*, *S. madagascariensis* and *Trichocaulon decaryi*.

South Africa.

The tropic of Capricorn passes through the southern extremity of Madagascar and Portuguese East Africa, the northern Transvaal, the great open spaces of the Kalahari in the Bechuanaland Protectorate, and it divides Hereroland from Great Namaqualand in South West Africa. We have already spoken of the Stapeliads in all of these countries, except the Transvaal.

Below the tropic, the subcontinent of South Africa, the broad paradise of the STAPELIEAE, is a land of strikingly characteristic physical aspect. It consists of a vast central tableland, separated from the sea on the east, the south and the west by diversified belts of country at decreasing elevations. The rim of the interior plateau is an escarpment of greater and smaller mountain ranges, beginning with the Drakensberge in the Transvaal and continuing roughly parallel to the coast through Natal, the Cape Province and up again into South West Africa. Many of the highest peaks in South Africa, rising up to nearly 11,000 feet elevation, form parts of the escarpment mountains.

The country within the escarpment is itself very varied. There are mountain areas, such as the Limpopo highlands of the northern Transvaal, the highlands of Basutoland and the Namaqua highlands in the west; there are great undulating plains, like the Bushveld of the central Transvaal and the glorious bracing High Veld of the southern Transvaal and the Orange Free State; there are the more arid regions, the Upper Karroo (or Karoo), the Kaap plateau of British Bechuanaland, and the great expanses of the Kalahari and Bushmanland; and finally there are wide tracts of low country where the Limpopo and Orange rivers have carved out broad valleys through the reluctant buttresses of the escarpment towards Portuguese East Africa and the Indian Ocean and towards Namaqualand and the Atlantic.

Where the escarpment has not been worn down by the leveling forces of the rivers, the land outside descends to the coastal plains on the east and south and west in successive steps, often forming important minor plateaus supported by lower ranges of mountains and hills. Particularly deserving of attention in any survey of the distribution of Stapeliads is the succession of descending steps in the south, first the Great Karroo, next the little Karroo, and finally the coastal plain.

In a land of such varied physical features as South Africa, the vegetation is naturally of great variety and richness. It is of three dominant types, forest, grass veld and the arid and semi-arid forms. These different types do not conform at all to the political

boundaries; their distribution is admirably shown on the map by Dr. I. B. Pole Evans, reproduced in Vol. II, and for a more detailed description of them one should study the admirable Presidential Address of Dr. Pole Evans before the South African Association for the Advancement of Science, 1920.

The principal forest areas are along the east and south coasts, covering a relatively small portion of the land. A narrow coastal belt of dense sub-tropical frostless vegetation, with an elevation up to 800 feet and a summer rainfall between 30 and 50 inches, extends from the Tropic through Portuguese East Africa, Natal and the Cape Province as far south as East London. Isolated patches of true timber forest, known as the temperate rain forests, punctuate this east coast belt at widely varying points, especially on the slopes of hills facing the sea, and are scattered on the kloofs somewhat further inland from the eastern Transvaal to the south coast of the Cape.

From Port Elizabeth west to Capetown and then north to the Olifants River stretches a wide belt of "Cape Scrub," composed of heavy evergreen bush and low scrub, remarkably uniform in aspect and of a characteristic dull grey-green color. The climate differs from that of the East Coast forest in having dry hot summers and a winter rainfall of 30 inches or more.

The second main type of the South African vegetation, the grass veld, occupies most of the eastern half of the land, inland from the East Coast Forest to about the 26th meridian east of Greenwich. The north and east sections of the grass areas form a modified continuation of the typical African Savanna of the tropics. It is land covered with thick grass intermingled with deciduous bush and trees, appearing park-like where the trees are isolated or scattered in small groups, while at times the trees almost obscure the grass. The northern portion of this eastern Savanna follows the broad valleys of the Limpopo and other rivers in the northern Transvaal and southern Portuguese East Africa, forming a Low Veld region between 1,000 and 3,000 feet in elevation, dotted with baobabs and other tropical trees and often some covering of bush.

Below the eastern escarpment the Savanna-like veld continues south-westerly parallel to the coastal forest almost to Port Elizabeth, at 2,000 to 3,000 feet above sea-level, the grassy terraces accented by acacias, aloes and arborescent Euphorbias.

Within the escarpment, in the northern Transvaal, the Low Veld rises gradually to a more typical Bush Veld, which in turn gives way to the Middle Veld, characteristic of the country around Pretoria, so charmingly described in Miss I. C. Verdoorn's *Introduction to Botany and the Transvaal Veld Flowers*, 1933. Here are gently sloping hills, between 3,000 and 4,500 feet in altitude, covered with grass and broken by rocky ranges, with bush and stunted trees.

Between Pretoria and Johannesburg the Middle Veld merges at 4,500 and 5,000 feet into the pure High Veld, the bracing rolling plains of unbroken grass which continue through the Orange Free State and penetrate the south-eastern Cape Province almost to Bedford. The grasses in summer stand three feet high, turning brown with the first frosts. In the spring perennial undershrubs and wild flowers are gay everywhere before the grasses outtop them. Trees and bush are seldom seen, except in occasional sheltered spots. Summer rains vary from 20 to 35 inches.

A final form of grass veld, with the grasses growing in lower tufts in combination with shrubs, bracken and many bulbous plants, is found in the highlands of Basutoland, extending much less prominently into the Transvaal, the Orange Free State, Natal and

the Cape Province. The elevation in these Eastern Mountain grasslands ranges from 4,000 to 8,000 feet. The climate combines a high summer rainfall, 40 to 60 inches, with dry cold winters.

The third type of the South African vegetation dominates the country west of the 26th meridian east of Greenwich. It is a vast arid and semi-arid expanse, extending from above the tropic down to the Cape Scrub belt at the south coast of the Cape Province and embracing the Kalahari Thorn country, the Karroid semi-desert and the west coast desert strip.

The Kalahari Thorn country occupies the very centre of South Africa, the Kalahari region in the Bechuanaland Protectorate, with tongues of land entering the northern Transvaal, a bit of South West Africa, British Bechuanaland, and much of Griqualand West. It is open land, with sandy flats of a typical red hue, dotted with sparse grasses and thorn trees. The elevation runs from 2,000 to over 4,000 feet. Rainfall averages about 15 inches a year, with long winter droughts. Stapeliads are found alike on the sandy flats and among rocks or under bushes on the hills and mountain slopes. Several, such as *Duvalia polita*, *Huerniopsis decipiens* and *Tavaresia grandiflora*, have a surprisingly long range, but the number of different species is noticeably smaller than in the Karroid areas.

The Karroid areas lie west and south of the Kalahari, beginning in South West Africa and broadening out greatly in the Upper Karroo of the Cape Province, whence they descend across the southern escarpment almost to the south coast. Rainfall varies from 5 to 15 inches, being highest in the south-east. Winter rains occur in the west and south. Vegetation consists of desert shrubs of fairly uniform height, widely spaced in the bare soil. Succulents are numerous. Large parts of the plains, especially near the river beds, are covered with soil washed down from higher ground by heavy rains, and Stapeliads appear to be less frequent on this alluvial Karroo soil than they are on the alluvial soil of the Transvaal or the Kalahari. Most of the Karroo Stapeliads select their habitat on the slopes or on any little rise, and as elsewhere usually gather under bushes or find anchorage between rocks and stones.

The west coast region between Angola and the Olifants River comprises two distinct floral regions, the Namib desert and the Namaqualand coast belt. The Namib, in South West Africa, is perhaps the only true desert in South Africa, and few plants other than succulents are found. Sometimes no rain falls in certain sections for several years on end, and the average yearly fall is only from 1 to 5 inches. The Namaqualand coast belt begins a little south of the Orange River and extends down to the Olifants River. This coastal belt is well furnished with vegetation, the shrubs often 8 feet in height, and succulents are in the minority.

A more detailed study of the distribution of the Stapeliads should be made with some appreciation of the more important geological features of the country; and, while the space available is too restricted to permit of our pursuing this phase of the subject at the present time, the following outline by our collaborator, Mr. Luckhoff, will serve as an introduction.

The geology of South Africa in relation to the distribution of Stapeliads. (By C. Luckhoff).

The following is a list of the principal geological systems of South Africa arranged in order of increasing age:

1. Sand, alluvium, and marine and various other beds, comprising recent and tertiary systems. These are found (1) along the west coast from Walvis Bay to Lüderitz Bay, extending 50 to 80 miles inland; (2) along the greater length of the coast from the Orange River mouth to the Cape Peninsula, and at various points along the south coast as far as Algoa Bay; (3) the northern coast of Natal and the greater part of Portuguese East Africa; (4) the eastern half of South West Africa, nearly the whole of the Bechuanaland Protectorate, a small portion of Southern Rhodesia and the greater part of British Bechuanaland.

2. The Karroo system. This embraces the south-eastern Transvaal, the whole of Natal except for a coastal belt 50 miles wide, the Orange Free State, and the greater portion of the Cape Province, except for a coastal belt 100 miles wide from the Keiskama River in the east to the Orange River in the north, where the belt expands eastwards across northern Bushmanland, and the valley of the Orange River as far as Prieska. The system extends along the Harts River as far as Vryburg, and appears in South West Africa at several places, notably Mariental, Gibeon, Keetmanshoop and west of Warmbad.

3. The Cape system. This is limited to the 100 miles wide coastal belt, extending from the Keiskama River to the mouth of the Olifants River, in the north-western Cape, and to the 50 miles wide coastal belt of Natal.

4. The Transvaal system. This forms a considerable part of the Transvaal and Griqualand West, as far as the Kuruman River and Vryburg in the north. The system appears again in Southern Rhodesia.

5. The Nama system. This forms intermittent belts in South West Africa, and reappears in the western Cape coastal belt (Richtersveld, Van Rhynsdorp, Piquetberg, Malmesbury, Capetown, Worcester, Swellendam, Cango).

6. Various other old systems, too intricate in their distribution for mention here, but limited to the Transvaal, Southern Rhodesia, and a few points in South West Africa.

7. The intrusive rocks: including red granite in the Transvaal, young granites in the Cape, and the old granites, comprising large tracts of South West Africa, nearly the whole of Little Namaqualand and northern Bushmanland, portions of the Natal coastal belt, the eastern Transvaal, and the greater portion of Southern Rhodesia.

8. The Karroo dolerites. Outcrops of dolerite occur throughout the Karroo system, their southern limit being a line drawn through Sutherland, Beaufort West, Aberdeen, Somerset East, and East London, approximately.

As an instance of the dependence of the flora upon the geological formation, it is worth mentioning here the difference which exists between the flora supported by the Malmesbury, Bokkeveld and Witteberg shales and that of the Table Mountain sandstone. The flora of the shales consist essentially of *rhinosterbos* and a host of bulb plants. *Rhinosterbos* is useless as stock food, and collects no moisture from prevailing mists or clouds. The flora of the Table Mountain sandstone, and hence of the Cape mountains, consists of thousands of species of heaths, proteas, grasses, small bush, shrubs and hardwood trees, as well as many bulbous plants, all of which in the earliest days made the Cape famous for the variety of its flora. This vegetation of the Table Mountain sand-

stone, though of little value as stock food, collects moisture from any prevailing mist, and this factor plays a very important part in the maintenance of natural water supplies.

These two types of flora are each distinct to their own geological formation and are never found out of their own environment. This can be seen to perfection in any Western Province valley, where the shales are in contact with the overlying Table Mountain sandstone. The rhenosterbos gives way at the junction to the flora of the Table Mountain sandstone, the line of demarcation being scarcely a yard wide. One could walk for a mile through the rhenosterbos on a misty day and remain perfectly dry, but let one walk for five yards through the flora of the Table Mountain sandstone and he will be soaking wet.

This limitation of the flora by the geological formation persists throughout the Cape and South West Africa, though less apparent than in the Western Province. (I have not had experience of the other provinces, where the climate will come to have an ever-increasing influence). Thus the flora of Namaqualand is distinct from that of the Great Karroo, and also from that of Bushmanland, influenced in the latter case by the abundant limestone and by the climate and rainfall. The flora of the Karroo system itself varies from one district to another. The Karroo bush gives way to rolling grasslands and indigenous forests in the Eastern Cape (Transkei, etc.), and to the High Veld of the Orange Free State.

The Great Karroo is wrongly looked upon as a desert. Though the rainfall is small, abundant moisture is derived from dews and frosts at night, especially in the eastern karroid regions. The desolate outlook of certain districts during periods of drought, is largely to be ascribed to the ravages wrought by the prevalent practice of overstocking. The soil of the Great Karroo is one of the richest and deepest in South Africa, especially in regions where it is associated with excessive banks of decomposing dolerites.

Another important factor determining succulent flora, and one that is not generally recognized, is the strength of the actinic rays of the sunlight. It is well known that many succulents (Stapeliads included) from the open veld of the Karroo and elsewhere cannot, even for a few weeks, stand full sun in the Western Province, although the latter has a good rainfall and is altogether of a moister, cooler atmosphere. Succulents seem literally to boil away in our Cape Peninsula summer sun, although they can withstand years of scorching Karroo sun.

In those regions where there is a large amount of white quartz, as in the Knersvlakte, Van Rhynsdorp, this quartz comes to play a part in the life of its succulents. The quartz reflects the light and heat, thereby keeping the roots cool; owing to its polish, it does not absorb much heat by radiation; and it serves to condense moisture from mists.

As a general rule the great majority of the Stapeliads in South Africa grow under bushes, generally on the southern aspect of the hills. These bushes provide summer shade and at the same time allow access of sunlight in winter. An exception amongst the small Stapeliads is *Stapelia portae-aurinae*, which in its habitat south of Witputs, South West Africa, is invariably found in the clefts of rocks, never in the open, whilst the converse holds good for *S. longipes* from the same locality.

The large *Trichocaulons* and *Hoodias* can of necessity not grow under bushes, some selecting exposed stony ground, as *T. kubusense* and other spiny-stemmed *Trichocaulons* and *Hoodias* near Sendlingsdrift, *T. halenbergense* in the Halenberg mountains, *T. de-laetianum* in the Klinghardt mountains, South West Africa, and *T. piliferum* in hills near Oudtshoorn and *T. annulatum* in rough hills near Willowmore, Cape Province.

Others again seek out flat open spaces, where they stand dotted about in compact clumps, several feet in height. Such are *Hoodia gordonii* in Great and Little Bushmanland, and other *Hoodias* growing near the train-line near Klein Karas, South West Africa.

I have seen at Obib, north of Sendlingsdrift, South West Africa, some of the spineless-stemmed *Trichocaulons* growing in the narrowest crevices of vertical banks of pure white quartz, with never a trace of a plant on the surrounding level ground.

Stapelia revoluta and *Huernia reticulata* grow on level stretches of pure sand several feet deep near Klaver in Van Rhynsdorp district. They are generally under bushes, though often in sheltered sandy hollows abutting on sandstone rocks. *S. revoluta* has the habit of producing its stems underground, and they only emerge again at the surface three to twelve inches from the parent plants. They then grow up, perfectly erect, to a height of six to eighteen inches. The plants are hence not compact.

Pectinarias seek the deep shade of dense bushes or of stones, and in cultivation flourish best in dark positions away from the sunlight.

The Transvaal.

We quote the following interesting description of the Transvaal from Dr. H. G. Schweickerdt's Short Account of the Succulent Flora of the Transvaal in The Cactus Journal, 1934:

"The Transvaal is the most northern of the four provinces constituting the Union of South Africa and, together with Swaziland, has an area of 117,000 square miles as compared with the 122,000 square miles of Great Britain and Ireland.

"The eastern boundary is formed by the Lebombo mountains, which botanically are an unknown territory. The eastern part of the province is furthermore traversed in its whole length from south to north by the Drakensbergen, a mountain range parallel to that of the Lebombo. At right angles to the former and running in a westerly direction, such ranges as the Magaliesbergen, the Waterbergen and the Zoutpansbergen traverse a great part of the province.

"Roughly speaking, the area between the Drakensbergen (8,500 ft.) and the Lebombo Range (4,000 ft.) to the east, and between the Zoutpansbergen (6,000 ft.) and the Limpopo River to the north is what is known as the true 'Low-veld' (1,000 to 2,500 ft.). The country between the Magaliesbergen and the Zoutpansbergen constitutes roughly what is known as the 'Bush-veld' (3,000 to 4,000 ft.). The southern and south-western part of the province is known as the 'High-veld' and has an elevation ranging from 3,000 to 6,000 ft.

"It is impossible to give exact figures of the annual rainfall, since this amount in any particular region is very variable. In the eastern mountain region (Drakensbergen) it is somewhere between 50 and 80 inches, a fairly high rainfall for South Africa; in the remaining parts of the province it is much lower, varying from 15 to 40 inches. The province falls within the area of summer rains; the rainy season extends from October to March, and the remaining months are generally dry, except for an occasional shower falling in the eastern mountain region. In a province of so large an area, where the elevations range from below 1,000 ft. up to 8,500 ft., and where the rainfall varies from a few inches to 80 inches per annum, it is only natural that various types of vegetation are to be met with in various localities. As succulents occur in all parts of the province, the number of different types is a relatively large one, including about 25 Stapeliads."

The Transvaal Stapeliads may be roughly divided in two groups, the rock-loving and the sand-loving species. Those which prefer a rocky substratum are usually found growing on rocky hill-slopes or among rocky outcrops. Among them are many of the *Huernias*, including *H. transvaalensis*, *H. loeseneriana*, *H. confusa*, *H. bicampanulata* and *H. nouhuysii*, with a smaller proportion of the *Carallumas* and *Stapelias*. "These plants generally prefer the sunny northern slopes of the mountains and some of them are not easily detected, as they often grow wedged in between rocks or are partly hidden by tufts of grass or other succulents, such as species of *Crassula*, *Cotyledon* and *Euphorbia*. They are not very abundant."

The Stapeliads which prefer a sandy soil are naturally to be looked for wherever the sandy plains of the Kalahari have been able to enter the Transvaal, in the northern districts or in a few valleys of the more central districts. "The soil in these localities consists of very fine sand, in fact it is almost silty; the grass cover is fairly scanty and the thorny bushes and small trees form clusters allowing ample unprotected spaces in between." In such localities may be found *Caralluma lutea*, *Huerniopsis atrosanguinea*, *Duvalia polita*, *Huernia zebrina*, *H. vogtsii*, *Stapelia gettleffii*, *S. nobilis*, *Tavaresia grandiflora* and others. These plants crowd in for shelter under the scattered bushes and shrubs, and the winds help in concentrating their seeds there. "They furthermore appear to prefer an eastern aspect; this is probably due to the fact that during the morning the sun is not as penetrating as during the afternoon. Thus when out succulent hunting one cultivates the habit of looking on the eastern sides of bush groups, and the harvest invariably is a rich one."

Transvaal: Zoutpansberg district.

This is the most northern district in the Union, situated wholly within the tropics. It derives its name from the beautiful Zoutpansberg range in the south central section. At the foot of these mountains to the west is the Zoutpan (salt pan), a shallow brackish depression about a mile wide. North of the range a desert belt sixty miles wide stretches to the Limpopo River, the boundary of Southern Rhodesia. This Low Veld area is flat, intensely hot and dry, with an annual (summer) rainfall of about eight inches. It is thickly covered with low desert scrub and scattered baobab trees, gigantic fellows, sometimes 100 feet in girth.

On the southern slopes of the Zoutpansbergen, *Stapelia nobilis* has been collected near Louis Trichardt, the principal town of the district. At Wylie's Poort, the pass to the northern side of the mountains, where the road runs between cliffs 1200 feet high, J. J. van Nouhuys discovered two new species, *Huernia nouhuysii* and *Stapelia clavicorona*. The flat strip along the northern base of the mountains is particularly rich in Stapeliads. On a trip to this section in 1932, in the short stretch between Waterpoort Station and Zoutpan, partly on the flat and partly on the northern slope of the mountain, Miss A. A. Obermeijer, Miss I. C. Verdoorn and Dr. H. G. Schweickerdt collected *Huerniopsis atrosanguinea* (at Farm Chapudi), *Caralluma maculata* (frequent), *C. schweickerdtii*, *Duvalia polita* var. *transvaalensis* (Farm Chapudi), *Huernia zebrina* var. (frequent under bushes), *Stapelia gigantea* (a few plants just above the Salt Pan), *S. nobilis* (large colonies in the sandy flats under the thorn trees), and *Tavaresia grandiflora* (in sandy flats). In the shelter of the larger trees immediately surrounding the Salt Pan were

found *Stepelia kwebensis* and *S. gettleffii*. Other records from the Zoutpansberg district include *Caralluma melanantha* and *Huernia bystrix* (Shilovane).

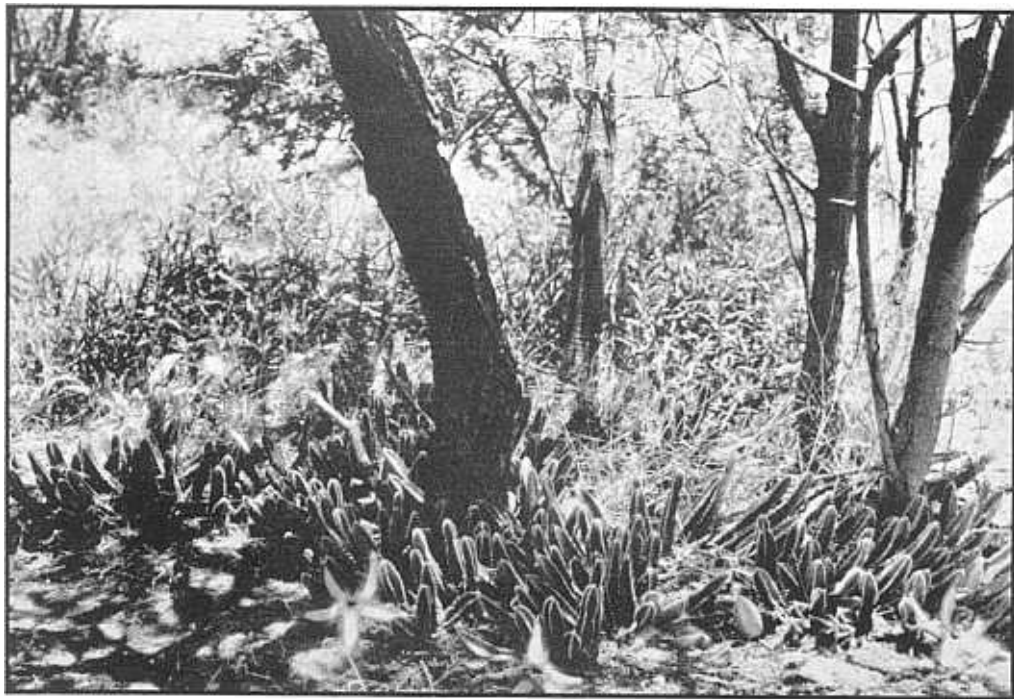


FIG. 23

Stapelia gettleffii Pott

Photo by Herbert Lang, of plants growing in their natural surroundings.

Transvaal: Waterberg, Potgietersrust and Pietersburg districts. (Note: the recently established district of Letaba is here included with Pietersburg).

These three districts extend across the Transvaal immediately below the Tropic line, each crossing into the Tropic at its northern end. They are largely Bush Veld country, with mountains to the south, notably the Zandrivierberge in the Waterberg district and the upper ranges of the Drakensberg in the Pietersburg district. Pietersburg, the most important town in the northern Transvaal, is situated on a high bare plateau at 4,200 feet elevation. Thirty-five miles to the east and north-east towers the great mass of the Haenertsburg and Woodbush mountains, the northernmost end of the immense Drakensberg range, whilst from ten to thirty miles south the Strydpoort range, a massive complex of lesser heights covering a very large area, forms the southern boundary of the district and, turning north-east past Chunespoort (the gorge of the Chunes River), finally merges itself with the Haenertsburg range. The gold fields, now assuming prominence, are situated in the Murchison range, seventy miles east of Pietersburg, on the border of the Kruger Game Reserve.

Stapeliads are well represented in all three districts. In the Waterberg district, Dr. Ernest E. Galpin of Naboomspruit, who was called by General Smuts "the Prince of Col-

lectors" for the thoroughness and excellence of his botanical researches, has recorded two species from the region of the Springbok Flats, at the border between Waterberg and Potgietersrust districts, *Caralluma lutea* and *Duvalia polita* var. *transvaalensis*, both rare in the glades of Thomboti trees at the eastern margin of Nyl Vlei near Naboomspruit. *Stapelia nobilis* extends from Nylstroom to the border of Naboomspruit, growing in great clumps in sandy loam at the foot of Acacia trees. *S. gettleffii* has also been reported from near Naboomspruit, and *Caralluma lutea* is common there. Other records from the district are *Stapelia kwebensis* at Fourieskloof, *Huernia vogtsii* at Visgat and *Caralluma melanantha* at several points.

Caralluma melanantha reappears frequently in Potgietersrust district, and is probably the most plentiful Stapeliad in all three districts, growing in small clumps on rocky hills or under bushes. In general the records for all the species in the district are concentrated in the belt running from Potgietersrust and Zebediela westerly to Kwarrie Hoek and the Hanglip Mountains. These records include the following:

- Caralluma carnosa* - in the neighborhood of the Zaaipplaats Tin Mine;
- Duvalia polita* and the var. *transvaalensis* - Kwarrie Hoek, etc.;
- Huernia brevirostris* var. *longula* (?) - Potgietersrust to Zebediela;
- Huernia loeseneriana* - at Potgietersrust;
- Huernia quinta* - Kwarrie Hoek, Hanglip Mountains;
- Huernia zebrina* var. *magniflora* - Kwarrie Hoek;
- Stapelia nobilis* - Potgietersrust and Kwarrie Hoek.

A comprehensive survey of the Stapeliads in Pietersburg district has been made by J. F. Kirsten of Pietersburg and others, showing the presence therein of eleven species:

- Caralluma lutea* - at Letaba;
- Caralluma melanantha* - frequent in Pietersburg Town Commonage, the hilly country to the south and at many other points in the district, under thorns and Euphorbias, and on thorny ridges;
- Caralluma rogersii* - near Mokeetsi;
- Duvalia polita* var. *transvaalensis* - at several points, approximately on the tropic;
- Huernia hystrix* - Mokeetsi and other points, in sandy soil amongst short aloes;
- Huernia vogtsii* - frequent, on the Krugersberg and north to the tropic;
- Huernia zebrina* var. - Farm Brodie Hill No. 106, a little north of the tropic, in hard sandy soil under thorn bushes;
- Stapelia gettleffii* - On the same farm as *Huernia zebrina*, under mimosa;
- Stapelia nobilis* - Pietersburg Town Commonage - large clumps in open veld;
- Stultitia rapscottii* - van Wyks Put No. 841, on the tropic, in short robust thorn;
- Tavaresia grandiflora* - near Chunespoort.

Transvaal: Eastern districts: Barberton, Lydenburg, Middelburg, Belfast.

Much of the Transvaal east of Pretoria is typical Middle and High Veld. Yet there are low-lying sandy depressions now and again that bear scattered low bushes and thorn trees, forming as it were tongues of the Kalahari, reaching between the mountain ridges, sometimes as far as the eastern escarpment. Such areas usually abound in succulents. A good example is the valley south of Pietersburg, through Chunespoort to the Olifants River, which has about 60 miles of the sort of flora associated with the Bechuanaland Protectorate and with the Transvaal north of the Zoutpansberg. The sand flats continue to within a few miles of Lydenburg, where the high veld reasserts itself. The section of the Lydenburg district, north-west from Lydenburg, where a number of Stapeliads have

been collected, is known as Sekukuniland. The name derives from that of a famous old Kaffir chief, Secocoeni, whose stronghold, during the fighting which preceded the occupation by the British in 1879, lay in the adjoining mountains.

Belfast district:

Huernia loeseneriana - Waterval Onder;

Middelburg district:

Caralluma melanantha - Selon's River Valley;

Huernia loeseneriana - near Witbank, on Gen. Hertzog's farm on the Wilge River;

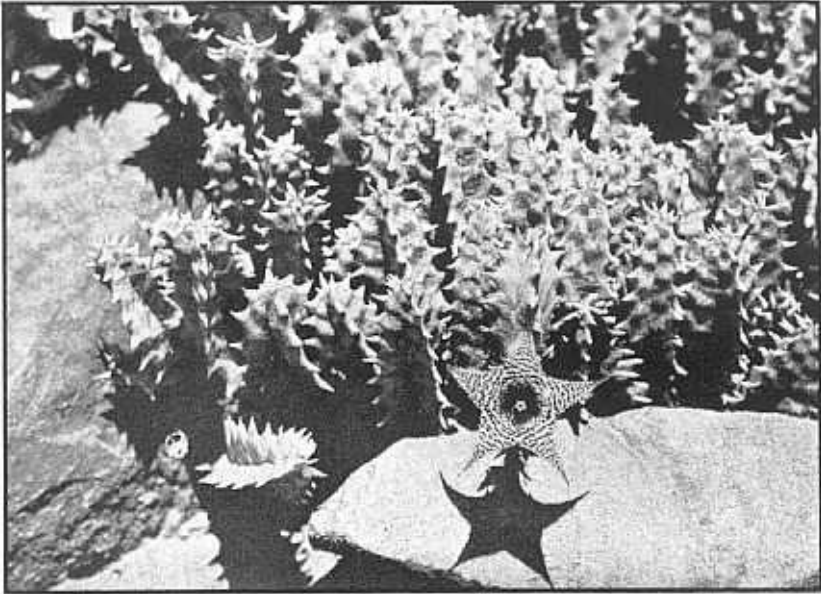


FIG. 24

Huernia vogtsii Phillips

Plant growing wild among rocks in flat sandy country at Buffelsvlei, Lydenburg district.

Photo: G. W. Reynolds, Johannesburg.

Lydenburg district:

Caralluma fosteri;

Caralluma lutea - Sekukuniland; Punda Maria;

Caralluma melanantha - Sekukuniland;

Duvalia polita - Waterval Valley; near Buffelsvlei;

Huernia bicampanulata;

Huernia confusa - on steep sides of a gorge on a farm just outside of Lydenburg

Huernia vogtsii - Sekukuniland; near Buffelsvlei;

Stapelia gettleffii - Waterval Valley; Malips Drift;

Stapelia grandiflora - Waterval Valley;

Stapelia nobilis - Sekukuniland;

Stultitia tapscottii - Sekukuniland; Waterval Valley;

Tavaresia grandiflora - Sekukuniland;

Kruger National Park:

Caralluma lutea;

Barberton District:

Huernia hystrix - Louws Creek; Plaston;

Huernia kirkii - near Barberton; near Komatipoort;

Stapelia gigantea - Louws Creek;

Stapelia leendertziae;

Stapelia wilmaniae - believed to have been collected near Barberton.

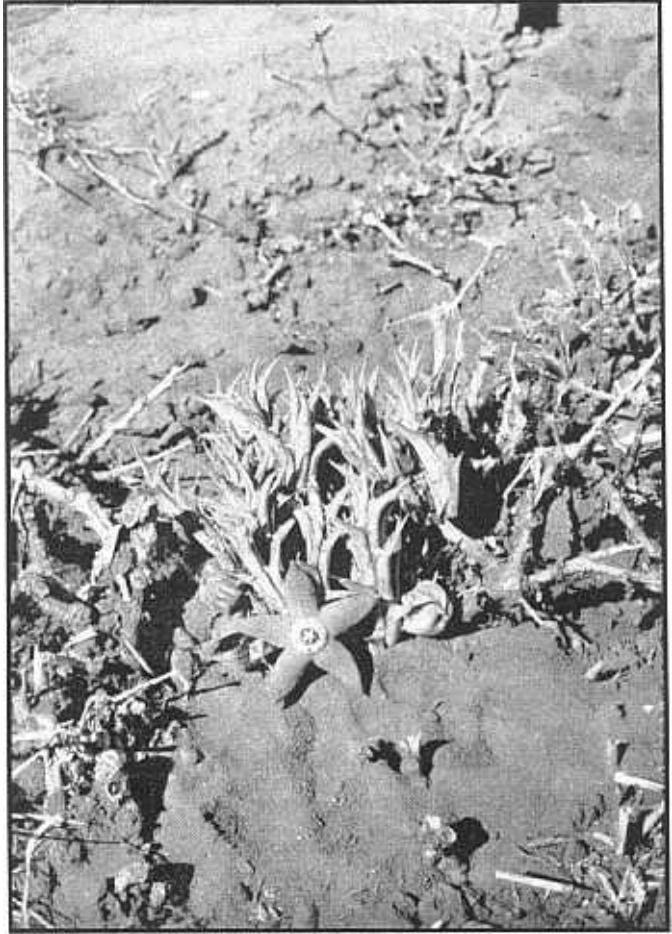


FIG. 25

Stultitia tapscottii Phillips

Plant in natural surroundings in
Waterval Valley, Lydenburg
District.

Photo: G. W. Reynolds,
Johannesburg.

Transvaal: Pretoria and Rustenburg districts.

The two districts of Pretoria and Rustenburg are separated by the low ridge of the Magaliesberg, and as the Stapeliads of each of the two districts are in large part located on the dry rocky slopes of this range they may well be enumerated together. The two districts form part of the Middle Veld, but the elevation is mounting rapidly into that of the High Veld immediately to the south. At Pretoria the elevation is already 4,500 feet. Rainfall averages 30 inches and is mainly concentrated in the hot summer months. Winters are drv. clear and cool.

Of the Stapeliads growing in the wild state nearest to Pretoria, *Caralluma lutea* and *Huernia loeseneriana* must head the list. Both are common on the surrounding hills, and they doubtless used to grow where the city now stands. *H. transvaalensis* and *Stapelia*



FIG. 26

Caralluma carnosa Stent

Photo by R. A. Dyer of a plant in its natural surroundings in the type locality (located near matchbox in lower right section of the picture)—growing among rocks, with protection of grass and small shrubs on north slope of the Magaliesberg range, at Zilikats Neck, 24 miles from Pretoria.

nobilis come fairly near the city also. *Huernia vogtsii* and *Caralluma carnosa* are shy.

Others native to the Pretoria side of the Magaliesberg are *Huerniopsis atosanguinea* (at Pienaars River), and *Duvalia polita*. *Stapelia nobilis* also grows near the Hartebeestpoort Dam, where the waters of the Crocodile River are impounded in the most extensive irrigation project in South Africa. On the Rustenburg side of the range, *Huernia transvaalensis* is again plentiful, especially around Northam, where the Crocodile River valley crosses the mountains, and for many miles along the range. Other species near the Crocodile River are *H. vogtsii* and *Stultitia tapscottii*. *Duvalia polita* grows further west between Rustenburg and Zwarttruggens; while *Caralluma lutea* is plentiful near Zwarttruggens and on the Pilandsberg, a remarkable volcanic ring of hills surrounding a vast crater ten miles in diameter. *Caralluma carnosa* is recorded also from Kransberg, 18 miles from the Thaba Zimbi iron mine.

Transvaal: Marico district.

The Marico district, in the western Transvaal, adjoins the south-east corner of the Bechuanaland Protectorate. J. C. J. Knobel of Zeerust writes us: "Large tracts (known as Bushveld) are dotted with trees and shrubs, the ground between covered with grass. The soil in many parts is heavy and greasy (known as turf) and there are many outcrops

and sandstone hills. Stapeliads occur for the most part on the level ground, frequently under shrubs and small trees. Rainfall is irregular. In 1924-25 it was 39 inches, while the following summer, 1925-26, it was less than 13 inches, the lowest on record." Zeerust is the principal town, at 3,900 feet elevation. The Stapeliads reported by Mr. Knobel are all species which grow also in the Bechuanaland Protectorate. Those from near Zeerust are *Duvalia polita* and probably the var. *transvaalensis*, *Stapelia nobilis* and *Tavaresia grandiflora*. *Caralluma lutea* is very plentiful in suitable areas, all the way from Zeerust to Rustenburg. Rare are *Stapelia gettleffii* and *Stultitia tapscottii*.

Transvaal: Southern districts: Johannesburg, Heidelberg, Krugersdorp, Bloemhof.

In the Flora Capensis not a single Stapeliad is recorded from the High Veld districts of the Transvaal south of Pretoria. More recently a few species have been collected therein. *Caralluma lutea* is the species most generally represented, in Johannesburg, Krugersdorp and Bloemhof Districts. *Stapelia leendertziae* was discovered in the Heidelberg District, near the small village of Heidelberg, and it has also been found in Johannesburg District. *S. nobilis* also grows in Johannesburg District.

Swaziland.

Swaziland is a small territory, administered by the British Colonial Office, forming a jog of about 6,500 square miles in the south-east corner of the Transvaal. It is separated from Natal and Portuguese East Africa on the east by the Ubombo and Lebombo mountains. It is grass covered country at about 5,000 feet elevation in the west, with fertile rolling downs in the central sections and partly arid bush-covered lowlands (about 600 feet elevation) in the valleys to the east. The Flora Capensis does not list a single Stapeliad from Swaziland, but in the last few years three species (*Caralluma ubomboensis*, *C. keithii* and *Huernia vogtsii*) have been collected in the Ubombo mountains near Stegi, 60 miles east of Mbabane, the headquarters of the government administration, and undoubtedly others exist.

Natal and Zululand.

Natal, including the northern districts known as Zululand, is a Province of the Union of South Africa containing about 35,000 square miles. The land slopes up from the Indian Ocean in a confused succession of hills and mountains to the summit of the eastern Escarpment at the Orange Free State boundary. Rainfall at the inland city of Pietermaritzburg averages 30 inches, with dry winters. Prof. J. W. Bews of the Natal University College at Pietermaritzburg has published a very complete Flora of Natal and Zululand, 1921, which furnishes an excellent starting point for a study of the native Stapeliads. The native name for all the species is *uZililo*. The commonest species at many points is *Huernia bystrix*, found in thorn veld and frequently on ant heaps all through the uplands (near Weenen, Greytown, Camperdown, etc.). It occurs also in Zululand (Eshowe), as does *H. zebrina* (Mkusi), and probably *Stapelia conformis*. *Caralluma ubomboensis* is from the Ubombo mountains in northern Zululand. The famous *Stapelia gigantea* is recorded from Nkandhla and Eshowe in southern Zululand. *Caralluma lutea* appears to be plentiful in a number of warm Natal valleys, especially in the Umlaas

River valley, west of Camperdown. *Duvalia polita* is another species from the Umlaas River valley, and the Muden River valley. *Stapelia woodii* is localized in the Noodsberg Hills, 50 miles north of Pietermaritzburg, and *S. nobilis* grows in the Drakensberg Range, near the Orange Free State border. The final record is *Huernia transvaalensis*, near Magut, by the northern border between Natal and Swaziland.

Basutoland.

Basutoland, a territory of 12,000 square miles between the Orange Free State, Natal and the Cape Province, is politically not a part of the Union of South Africa, but is governed directly by the British Crown. It is a mountainous country, with lofty valleys and summits over 11,000 feet. Scenery is magnificent in this, the Switzerland of South Africa, and the climate is clear and invigorating, with heavy summer rains. The flora in most sections is very varied and alpine in character. The only certain record of a *Stapelia* is *S. flavirostris*, from Leribe, near the Orange Free State boundary.

Orange Free State.

The Orange Free State is an inland province of the Union of South Africa, situated south of the Vaal and north of the Orange and Caledon rivers, with an area of about 50,000 square miles. The country consists of broad undulating almost treeless High Veld plains, from 4,000 to 5,000 feet above the sea, with some mountainous sections on the eastern boundary between Natal and Basutoland. The climate throughout the Free State is dry and bracing, with a summer rainfall between 15 and 30 inches.

Not a single Stapeliad is recorded in the Flora Capensis, and later records appear very incomplete, as they refer only to four of the southern and south-western districts, Smithfield, Philippolis, Fauresmith and Jacobsdal, leaving the remaining twenty-nine districts unrepresented. The species so far known are the following:

- Caralluma lutea* - Fauresmith Distr.: on kopjes in Veld Reserve; near Luckhoff; Philippolis Distr.;
- Duvalia radiata* - on kopjes near the Kromellenboog River on border of Fauresmith and Edenburg districts;
- Duvalia radiata* var. *birtella* - Fauresmith Distr.;
- Huernia barbata* - Fauresmith;
- Huernia hystrix* - without locality;
- Stapelia ambigua* var. *fulva* - Philippolis;
- Stapelia flavirostris* - Smithfield: kopjes in town commonage; Fauresmith Distr.: abundant on kopjes;
- Stapelia gemmiflora* - Fauresmith Distr.: in the Veld Reserve;
- Stapelia jucunda* - 5 miles north of Luckhoff;
- Stapelia olivacea* - kopjes near Philippolis; and near Fauresmith;
- Stultitia cooperi* - Jacobsdal Distr.: on road to Jacobsdal;
- Tavaresia barklyi* - Smithfield Distr.: farm Springbokfontein; Fauresmith Distr.: on kopjes near Koffiefontein; also from Luckhoff to Philippolis, 10 miles north of the Orange River.

Cape Province: Bechuanaland.

Bechuanaland, or British Bechuanaland, as it is called on many maps to distinguish it from the Bechuanaland Protectorate across the Molopo River to the north, is the most

northerly section of the Cape Province and embraces five districts, Mafeking, Vryburg, Taung, Kuruman and Gordonia. Except for a spur of the High Veld grassland near Vryburg, the whole of this wide tract of over fifty thousand square miles lies within the Kalahari Thorn country, though usually its aspect is more grass covered and more completely devoid of trees than is the thorn country north of the Molopo River. The elevation is between 3,000 and 4,000 feet. Pasturage is good, and the soil rich wherever water can be brought to it. The Kalahari Game Reserve occupies a large area in Gordonia, in the centre of the ostrich country. Whether the ostriches, who have the reputation of dotting on Stapeliads, have contributed to a scarcity of the plants, is not really very probable; yet the *Flora Capensis* mentions only one record from any of the five districts. This is *Huerniopsis decipiens*, from near Vryburg. *Trichocaulon officinale* is believed to have been first obtained from Bechuanaland, but it has not been localized there. More recent records include *Caralluma lutea* in Mafeking, Vryburg and Kuruman districts; *Duvalia polita*, *Huernia longituba* and *Huerniopsis decipiens*, 9 miles east of Kuruman; and five species from Gordonia, *Caralluma nebrownii* (or the var. *pseudo-nebrownii*), *Hoodia rosea*, *H. langii*, *Tavaresia barklyi* and *Trichocaulon marlothii*.

Cape Province: Griqualand West.

Griqualand West was annexed to the Cape Province in 1880, thirteen years after the discovery of the diamond fields. It embraces the four districts of Barkly West, Kimberley, Herbert and Hay, with a total area of 15,000 square miles. On a map Griqualand West looks like a far-flung "W," the right hand or eastern slope of the letter being the boundary of the Orange Free State, with the city of Kimberley at the heart of the diamond fields, while the other three strokes of the "W" follow the windings of the Orange River along the south and south-west boundaries.

Altitudes in Griqualand West range from 4,000 feet at Kimberley to 6,000 feet in the rocky ranges of the Langeberg and Asbestos mountains in the west, and fall to 3,000 feet at the Orange River in the south. The great Kaap plateau, in the centre of Griqualand West, receives its name, Miss M. Wilman tells us, from a corruption of the word *Gaap* (*Trichocaulon* or *Stapelia*), so that it means "the Stapeliad plateau."

In the north of Griqualand West, grass and thorn veld predominates. The southern part of the country is "mixed veld," where the Kalahari vegetation meets the more arid landscape of the Karroo coming up from across the Orange River. After rare periods of extensive rains, as in 1934, the whole of Griqualand West becomes covered with grass, and the entire country is then what the botanists call it, "Kalahari grass land." But this condition is the exception and not the rule, and in many localities the frequent long droughts give the Stapeliads and other succulents a distinct advantage in the struggle for existence. The climate as a whole combines hot summers with wonderful cold dry winters. Frosts are heavy and sometimes bring injury to the succulents. "Plants," says Miss Wilman, "survive best which nestle among the grasses or at the foot of *bosjes* (little shrubs), where they find some protection from the 'wild west winds.'"

The earliest collections of Stapeliads in Griqualand West were made by David Arnot, about 1871, and included *Stapelia arnoti*, *S. verrucosa* var. *pulchra* and *Piarranthus grivannus*. Their habitat is unknown, the settlement of Griva, referred to in the specific name of the *Piarranthus*, having vanished from local memory. It may have been in the southern part of the Herbert district, where Arnot was stationed.

Recent records of Stapeliads in the Herbert district centre around Douglas, near the middle point of the "W," and Mazelsfontein, exactly at this middle point, at the confluence of the Vaal and Orange Rivers. Around Douglas the records include *Caralluma lutea*, *Hoodia gordonii*, *Huernia longituba*, *Stultitia cooperi*, *Tavaresia barklyi*, *Trichocaulon cactiforme*, *T. officinale*, *Stapelia jucunda* and *S. parvipuncta*. At Mazelsfontein,



FIG. 27

Hoodia gordonii Sweet

Photo: G. W. Reynolds, Johannesburg, of a plant in its natural surroundings, 6 miles south-east of Douglas, Griqualand West.

where collections have been made principally by a former resident, Mrs. Ethel Anderson, the first six species just mentioned are again found, plus *Duvalia pubescens*, *Huerniopsis decipiens*, *Stapelia flavirostris*, *S. flavopurpurea* and its var. *fleckii*.

In the Kimberley district *Caralluma lutea* is widely distributed and is a joyous sight with its gay yellow flower clusters in bloom, the joy being tempered by the truly awful smell. *Stapelia flavirostris* grows near Kimberley, and a color variety of it is found in the mining areas. Mr. Tapscott writes us of a single plant of *Caralluma longicuspis* growing on his former farm near Kimberley. Just north of Kimberley occur *Stultitia*

cooperi and *Stapelia gemmiflora* with its var. *hircosa*. *Tavaresia barklyi* is recorded from the southern portion of the district, and *Stultitia tapscottii* without precise locality.

In the Barkly West district three species are recorded, from between Warrenton and Fourteen Streams, *Caralluma lutea* (growing together with *Lithops lesliei*), *Huernia longituba* and *Huerniopsis decipiens*.



FIG. 28

Caralluma lutea N. E. Brown

In natural surroundings at Warrenton, growing in association with *Lithops lesliei* (see lower left corner).

Photo: G. W. Reynolds, Johannesburg.

In the Hay district Stapeliads have been reported from several points. At Griquatown, the headquarters of the first Griqua settlers, we meet with *Huerniopsis decipiens*, *Piarranthus foetidus* and *Stapelia flavirostris*. At Read's Drift, on the Orange River due south from Griquatown, grow *Huernia longituba*, *Huerniopsis decipiens* and *Trichocaulon officinale*. *Hoodia gordonii* is found on the Kaap plateau. In the Paardeberg mountains, across the Orange River from Prieska, Dr. J. Luckhoff and his son have collected *Huernia longituba*, *Huerniopsis decipiens*, *Stapelia jucunda* and *S. olivacea*. Further north, in the Asbestos mountains, there have been records of *Hoodia bainii*, *Stapelia flavopurpurea*, *S. olivacea* and *Trichocaulon officinale*. And still further to the north, in the Manganeze mountains at Postmasburg and through the low barren thorn-bush country which stretches on into Bechu-

analand, grow *Huerniopsis decipiens*, *Caralluma lutea*, *Huernia barbata* var. *griquensis*, *Piarranthus comptus*, *Stultitia cooperi* and, near the Bechuanaland border, *Tavaresia barklyi*. A final record, from the north-eastern part of the district, is that of *Trichocaulon officinale*, collected by Miss M. Wilman at Papkuil.

Cape Province: Barkly East to Albert districts.

The high veld of the Transvaal and Orange Free State continues southward across the Orange River into the Cape Province, and merges on the west and south-west into the increasing aridity of the Karroid areas. The districts of Herschel, Barkly East, Lady

Grey, Aliwal North, Molteno, Wodehouse and Albert lie in whole or in part in this high veld zone and enjoy the same fine climate that is famous further north, with heavy summer thunderstorms to moderate the heat and in winter warm sunny days and clear frosty nights. Stapeliads are scattering, and the following short list of records is doubtless incomplete:

- Duvalia corderoyi* - near the Orange River in Aliwal North district;
- Huernia barbata* - Albert district: near Burghersdorp; Lady Grey district: 14 miles south-east of Lady Grey on road to Barkly East; and in Aliwal North district;
- Huernia longituba* - near Aliwal North;
- Huernia piersii* - in the Stormberg region of Wodehouse district;
- Stapelia flaviostris* - near Burghersdorp; and at 5,000 feet in the Wittebergen, 7 miles south of Lady Grey;
- Stapelia gemmiflora* - near Aliwal North; and in Albert district;
- Stapelia verrucosa* var. - near Burghersdorp.

Cape Province: Orange River Karroid districts.

The districts of the Cape Province, which border the south bank of the Orange River in the karroid regions between Albert district and Little Namaqualand, are Colesberg, Venterstad, Philipstown, Hopetown, Prieska and Kenhardt. In its journey of nearly 500

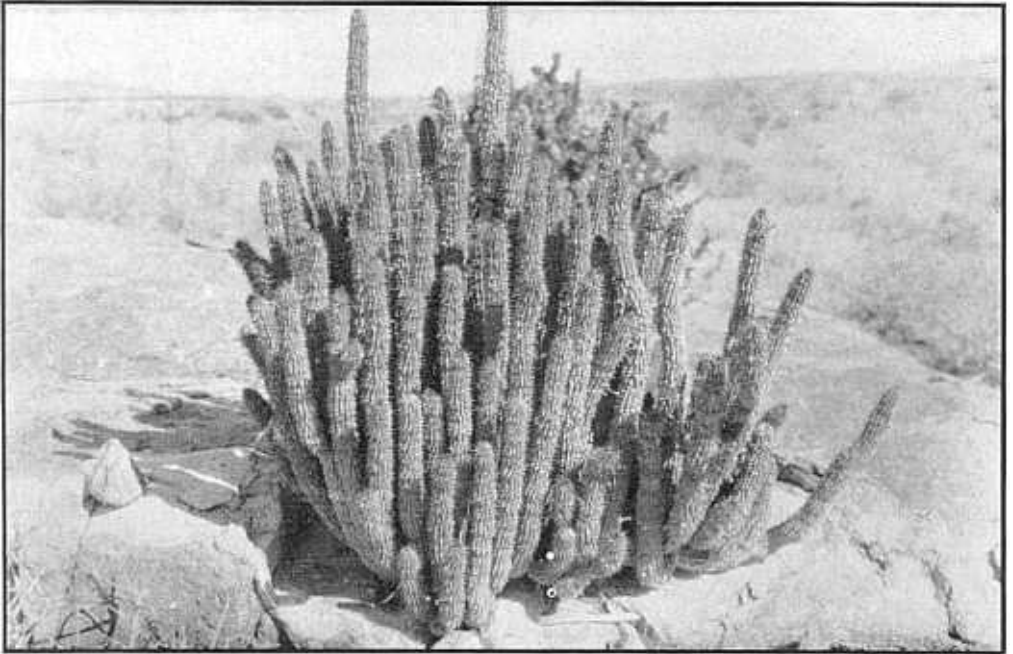


FIG. 29

Hoodia bainesii Dyer

In natural surroundings, Little Bushmanland. Photo by H. Herre.

miles along the boundary of these districts, the Orange River drops from an elevation of 4000 feet to about 1000 feet. (See *Stapelia gariepensis*). Considerable stretches of land along the river have been reclaimed by irrigation projects and the soil in places is remark-

ably fertile; but karroid conditions reassert themselves wherever irrigation ceases and at many points reach to the river itself. Whilst the districts of Colesberg, Philipstown and Hopetown present the typical Karroo aspect, the country west of Prieska is of quite another nature. From here the traveler can enter the Kenhardt district and traverse the great waterless plains of Great and Little Bushmanland, until he reaches the welcome haven of Springbok in Little Namaqualand. This vast expanse is relatively flat and consists of sand on a limestone foundation. The few hills and mountains are of granite, reminding one that he is crossing the country of the ancient granites, as found in Little Namaqualand. The climate is intensely hot in summer, with scorching west winds, but in winter it is dry, cool and bracing. Rainfall diminishes as the river flows to the west. It is above 20 inches in parts of Colesberg and below 10 inches in parts of Kenhardt, and it reaches a minimum of $11\frac{1}{4}$ inches at Gudous in Little Namaqualand, with shade temperatures over 120° in summer. Vegetation is scanty, and consists mainly of grass and mesembryanthemums. After phenomenal rains, as in 1934, the whole aspect of Bushmanland changes, for the grass which normally can barely exist may stand six feet high and cover the veld from horizon to horizon.

Stapeliads are well distributed in all this country, the *Trichocaulons* first appearing in the Prieska district and becoming very numerous in Kenhardt district. An excellent survey of the Prieska species has been made by the local Wild Flower Preservation Society, of which E. R. Fuller is the President.

- Caralluma longicuspis* - uncertain in Prieska district;
- Caralluma lugardi* - Prieska district;
- Caralluma lutea* - Hopetown and Prieska districts;
- Caralluma nebrownii* var. *pseudo-nebrownii* - Kenhardt district, near Kakamas
- Duvalia corderoyi* - Prieska district;
- Duvalia maculata* - Prieska district;
- Hoodia bainii* - Kenhardt district, Bushmanland;
- Hoodia gordonii* - Prieska and Kenhardt districts;
- Huernia barbata* - Karroo near Colesberg; and Prieska district;
- Huernia clavigera* - Prieska district;
- Huerniopsis decipiens* - Hopetown and Prieska districts;
- Piarranthus mennellii* - Kenhardt district, Theronville (Pofadder);
- Piarranthus pallidus* - Kenhardt district, Theronville;
- Piarranthus pulcher* - uncertain from Colesberg district;
- Stapelia desmetiana* var. *fergussonae* - a few miles south of Colesberg;
- Stapelia flavirostris* - Colesberg district;
- Stapelia flavopurpurea* - Prieska district;
- Stapelia grandiflora* - Venterstad district;
- Stapelia jucunda* - Prieska district;
- Stapelia olivacea* - Colesberg, Venterstad, Philipstown and Prieska districts;
- Stapelia virescens* - Philipstown, Hopetown and Prieska districts;
- Stultitia cooperi* - Hopetown and Prieska districts;
- Tavaresia barklyi* - Colesberg, Hopetown, Prieska and Kenhardt districts;
- Tavaresia grandiflora* - Prieska district;
- Trichocaulon engleri* - Kenhardt district, Theronville;
- Trichocaulon flavum* - Kenhardt district, Theronville;
- Trichocaulon keetmanshoopense* - Kenhardt district, near Kakamas;
- Trichocaulon marlothii* - Kenhardt district, near Kenhardt;
- Trichocaulon meloforme* - Prieska district;

Trichocaulon officinale - Prieska district;

Trichocaulon rusticum - Kenhardt district, near Kenhardt;

Trichocaulon simile - Kenhardt district, near Kakamas; Prieska division.

Cape Province: Little Namaqualand. (By C. Luckhoff).

Little Namaqualand forms the north-west corner of the Cape Province, from the Van Rhynsdorp district to the Orange River. It is an extension of the Bushmanland plateau, with a mean elevation between 2,000 and 4,000 feet. This plateau descends to the coast in a series of granite ranges and peaks, chief amongst which is the Kamiesberg range, leaving a coastal belt of sand and alluvium thirty miles wide, which widens out along the valley of the Orange River near its mouth. The Richtersveld (see Appendix F) lies



FIG. 30

A characteristic spineless *Trichocaulon* in its natural surroundings near Kliphoogte, Richtersveld.

Photo by H. Herre.

in the extreme northern corner of Little Namaqualand, occupying the great northward bend of the Orange River. Here the elevation again rises, forming inaccessible ranges 2,000 to 4,000 feet high. The north-eastern part of Little Namaqualand is known as Little Bushmanland, which extends eastward into Great Bushmanland in the Kenhardt district. The landscape in Little Namaqualand is characteristic, presenting an endless succession of rounded granite hills, interspersed with sand flats. Rainfall is small, mostly

DISTRIBUTION OF SPECIES

between two and six inches per year, and very much less in Little Bushmanland and around Port Nolloth. The Richtersveld derives most of its moisture from mists brought up from the Atlantic by west winds.

As one might surmise from its peculiar geological formation, Little Namaqualand is a paradise for Stapeliads, blessed with many of the most interesting species. There are doubtless many yet remaining to be discovered, particularly in the Richtersveld, for this part of the country has been incompletely explored botanically and each new expedition brings home its new treasures. Many of the species grow among granite and gneiss rocks, others in sand flats.

- Caralluma aperta* - Richtersveld; Springbok; Kokfontein; Kourkam; etc.;
- Caralluma armata* - foot of the Kamiesbergen;
- Caralluma acutiloba*;
- Caralluma dependens* (or perhaps a variety) - Richtersveld;
- Caralluma hottentotum* - O'okiep; Klipfontein;
- Caralluma hottentotum* var. *major* - Meskraal, near Komaggas; near Spektakel;
- Caralluma incarnata* and var. *alba* - Richtersveld;
- Caralluma mammillaris* - Richtersveld: Steinkopf;
- Caralluma parviflora*;
- Caralluma pruinosa* - Richtersveld: Komaggas;
- Caralluma pruinosa* var. *nigra* - 60 miles on the road from Springbok to Port Nolloth;
- Caralluma umdausensis* - Richtersveld: Steinkopf-Umdaus;
- Duvalia compacta*;
- Duvalia elegans* var. *namaquana* - Richtersveld: hills near Karrachab Poort;
- Duvalia pubescens* - Richtersveld: Steinkopf;
- Duvalia pubescens* var. *major*;
- Hoodia gordonii* - common on sand veld in Little Bushmanland; etc.;
- Huernia clavigera*;
- Huernia namaquensis* - sides of rocky gorge at Holgat; Richtersveld;
- Pectinaria articulata* var. *namaquensis* - near the southern border;
- Piранthus comptus*;
- Piранthus cornutus*;
- Piранthus pulcher* var. *nebrownii* - north of Springbok;
- Piранthus punctatus* and varieties;
- Stapelia acuminata* and the var. *brevicuspis*;
- Stapelia barklyi* - O'okiep;
- Stapelia deflexa* var. *brownii* - uncertain;
- Stapelia flavirostris*;
- Stapelia gariepensis* - near the Orange River;
- Stapelia herrei* - Richtersveld: Stinkfontein;
- Stapelia hirsuta* - Port Nolloth; Richtersveld;
- Stapelia longipes* var. *namaquensis* - Richtersveld: Swartwater;
- Stapelia namaquensis* - near Spektakel; var. *ciliolata* - near Komkam; var. *tridentata* - near O'okiep; and var. *bidens*;
- Stapelia neliana* - Richtersveld: Helskloof;
- Stapelia pedunculata* - near O'okiep; Kamiesbergen; and in Richtersveld;
- Stapelia rubiginosa* - Richtersveld: Remhoogte and Kliphoogete;
- Stapelia portae-aurinae* - Richtersveld;
- Stapelia pulvinata* - Kamiesbergen; etc.;
- Stapelia similis*;
- Stapelia umbonata* - Richtersveld;
- Stapeliopsis neronis* - Anisfontein;
- Tavaresia barklyi* - between Kokfontein and Koperberg;

- Trichocaulon alstoni* - stony fields near Namies; Steinkopf-Umdaus; etc.;
Trichocaulon cactiforme - near O'okiep; Richtersveld; Little Bushmanland; etc.;
Trichocaulon cinereum;
Trichocaulon columnare - Richtersveld: Helskloof and Kubus;
Trichocaulon kubusense - Richtersveld: Kubus;
Trichocaulon pictum - 28 miles north-east of Port Nolloth; Pella; slopes of quartzite hills south-west of Chubiessis;
Trichocaulon simile - Richtersveld: Tweeriver; Steinkopf-Umdaus.

Cape Province: Van Rhynsdorp district. (By C. Luckhoff).

The Van Rhynsdorp district is a flat expanse of country of a mean elevation of about 1,500 feet, which lies between the Bokkeveld mountains, the Olifants River, Little Namaqualand and the coast. The village of Van Rhynsdorp is the "jumping-off place" for Little Namaqualand - the succulent hunter's paradise. The vegetation of the Van Rhynsdorp district is wholly determined by the geological formation. The borders of the district provide fertile grazing ground, whilst the heart is occupied by the Knersvlakte, an arid waste composed of shales of the Nama system, limestone, salts and colored clays. The ultimate result is a quartz-covered soil of powdery texture, which has the peculiarity of becoming very readily waterlogged. Although the Knersvlakte is famous for its Mesembryanthemums, I do not think there is a record of any Stapeliad ever having been found there, although they abound on the neighboring grazing areas only a few miles away. The only exception may be *Echidnopsis framesii* at the northern border of the Knersvlakte, near the main road between Nieuwerust and the Zout River. Five species are cited from the Van Rhynsdorp district without precise locality, *Caralluma villetii*, *C. framesii*, *Piранthus framesii*, *Huernia guttata* and *Stapelia glanduliflora*; but I do not think any of them occur in the Knersvlakte, as my father and I have had wide experience of that region and have never found any of them there. We have located *S. glanduliflora* in the section west of the Knersvlakte, and what appears to be *Huernia guttata* in sandy situations near Klaver. The Knersvlakte is an object lesson in the localization of genera by the geological formation, without any necessary co-influence of geography or climate. The Bokkeveld mountains, which bound the Van Rhynsdorp division on the east, also form the most northerly outpost of mountains of the Cape system.

Other Stapeliads from the district are the following:

- Caralluma cincta* - near the Zout River Bridge;
Caralluma dependens - foot of the Bokkeveld mountains;
Caralluma incarnata and the var. *alba* - without locality;
Caralluma mammillaris - Klaver, on hills north of station; and Bitterfontein;
Duvalia radiata - without locality;
Huernia reticulata - sandy plains near Klaver;
Pectinaria tulipiflora - foot of the Bokkeveld mountains;
Piранthus foetidus - without locality;
Piранthus punctatus var. *A.* - foot of the Bokkeveld mountains;
Stapelia acuminata - 60 miles north of Van Rhynsdorp;
Stapelia cylista - near Klaver;
Stapelia revoluta - sandy plains near Klaver;
Stultitia cooperi - near Van Rhynsdorp;
Trichocaulon simile - near Van Rhynsdorp.

Cape Province: Calvinia and Sutherland districts.

The districts of Calvinia and Sutherland both lie in the western section of the Karroo system. The former borders the Van Rhynsdorp district along the Bokkeveld mountains in the west, adjoins Little Namaqualand and Great Bushmanland in the north, and the districts of Fraserburg and Sutherland in the east. The southern boundary is the Doorn River. It includes a portion of the Roggeveld range, the Bokkeveld Karroo, and in the north the lower reaches of the Trekveld. The town of Calvinia near the Hantam mountains is the centre of a considerable sheep farming industry.

The district of Sutherland is for the most part at an elevation of over 4,500 feet, comprising the plateau of the Middle Roggeveld, the western section of which forms the Roggeveld mountains extending into Calvinia district, and the Koedoes mountains bordering the Ceres district. To the south-east lie the Klein Roggeveld and Moordenaars' Karroo of the Laingsburg district. The district of Sutherland is also a good sheep district. The rainfall in both Sutherland and Calvinia districts is generally under 10 inches, with hot summers and the typical Karroo winters. Only a few Stapeliads have been recorded, comprising the following:

Calvinia district:

- Caralluma marlothii* - on road from Ceres to Calvinia;
- Caralluma maughani* - near Nieuwoudtville;
- Diplocyatha ciliata* - near Hantam;
- Pectinaria articulata* - on the edge of the Roggeveld mountains;
- Stapelia concinna* var. *paniculata* - Doorn River on the road from Loeriesfontein to Nieuwoudtville;
- Trichocaulon piliferum* - "Karoo below the Roggeveld," perhaps referring to Sutherland district;

Sutherland district:

- Caralluma longipes* - on the Roggeveld near Sutherland;
- Duvalia radiata* var. *birtella* - near Sutherland.

Cape Province: Central Karroid areas: Cradock, Maraisburg, Middelburg, Steynsburg, Hanover, De Aar, Britstown, Richmond, Murraysburg, Victoria West, Carnarvon and Fraserburg districts.

To the north of the Great Karroo, across the southern escarpment ranges, the Nieuwveld, Koudeveld and Tandjes mountains, spreads a far-reaching Karroid tract, sometimes itself mountainous, sometimes rolling country sparsely grassed, sometimes completely arid. The altitude averages 4,000 feet, rainfall is between 5 and 15 inches, and the climate is dry and bracing in the extreme with wide fluctuations in temperature. Wherever grass grows, sheep farming is practised, but much of the land is unused and the towns are widely separated. To the north the elevation gradually descends to the Orange River, and the districts bordering on the river have already been mentioned separately. No complete census of the Stapeliads in this central Karroid area has been taken, except for an excellent survey of the Cradock district made by H. W. James of Cradock.

- Duvalia corderoyi* - not uncommon in Cradock, Maraisburg, Middelburg and Steynsburg districts;
- Duvalia modesta* - Cradock;
- Duvalia reclinata* - Lake Arthur and throughout the Cradock district;
- Duvalia reclinata* var. *bifida* - Halesowen, 8 miles south of Cradock;

- Duvalia* sp. - unidentified; Gert Adriaans Kraal, Victoria West District; flowers described as deep brown, nearly black; noted by N. E. Brown as perhaps *D. caespitosa*;
- Hoodia albispina* - Van Wyks Vlei, Carnarvon district;
- Hoodia bainii* - also at Van Wyks Vlei; and in Fraserburg district;
- Huernia brevirostris* - Halesowen, Cradock district;
- Huernia brevirostris* vars. *scabra*, *immaculata*, *pallida* and *ecornuta* - all at Biesjes Poort, Victoria West district, and the first two also in Cradock district;
- Huernia humilis* - De Aar;
- Huernia primulina* and var. *rugosa* - near Cradock;
- Huernia simplex* - Gert Adriaans Kraal, Victoria West district;
- Huernia* sp. - an unidentified plant, near Halesowen, with stems like a *Pectinaria* and flowers somewhat like *H. bystris*, the spine-like fleshy papillae not as dense, and extending half-way down the corolla;
- Pectinaria arcuata* - Cradock district;
- Piранthus cornutus* var. *grandis* - near Victoria West;
- Piранthus foetidus* - plentiful in Cradock district;
- Stapelia ambigua* - near Victoria West;
- Stapelia desmetiana* and var. *apicalis* - Cradock district;
- Stapelia flavirostris* - probably general: recorded from Carnarvon, Cradock, Middelburg, Richmond, Steynsburg and Victoria West districts;
- Stapelia flavopurpurea* - Britstown, in veld under bushes;
- Stapelia gemmiflora* - De Aar; near Steynsburg; Middelburg district: Grootfontein School of Agriculture;
- Stapelia gemmiflora* var. *densa* - between Murraysburg and Richmond;
- Stapelia jucunda* var. *deficiens* - Biesjes Poort, Victoria West district;
- Stapelia olivacea* - Cradock; common near Rosmead, Middelburg district; Karroo, near Richmond Road Station;
- Stapelia verrucosa* var. *pulchra* - Cradock district;
- Stapelia virescens* - near Britstown; at Dwaal and Plaatjesfontein, Hanover district; east of Conway Station, Middelburg district;
- Stultitia cooperi* - near Cradock; east of Conway Station, Middelburg district;
- Tavaresia barklyi* - Karroo, near Richmond Road Station.

Cape Province: Eastern Section of Great Karroo: Graaff Reinet, Aberdeen, Steytlerville, Willowmore and Jansenville districts.

As one descends from the northern Karroid areas of the Cape Province to the south coast, three plains, like terraces or steps, are encountered, each separated from its neighbors by long mountain ranges. These are the plateau of the Great Karroo, extending from Graaff Reinet to Laingsburg, with an extreme span of 350 miles; the Little Karroo, from Uniondale to Touws River; and the coastal plain west from Port Elizabeth.

The Great Karroo is divided from the northern Karroid areas by the Nieuwveld and Koudeveld ranges. The highest point is the Kompasberg, 7,800 feet. The mean elevation of the plateau varies between 2,000 and 3,000 feet. The eastern section has a rainfall of around 18 inches, mostly occurring in the summer. The western section has principally a winter rainfall, rarely exceeding 10 inches and often very much less. In spite of the extreme dryness and the shriveled appearance of the vegetation during much of each year, the Karroo bush provides food for millions of sheep and goats and supports a great wool growing industry. Stapeliads are scantier in the eastern districts than they are in the west, but the *Duvalias* give a prime account of themselves in the Aberdeen

district, where four species are found near Aberdeen Road. The records from these eastern districts include the following plants:

- Caralluma marlothii* - Willowmore district;
- Duvalia compacta* - Willowmore district (?);
- Duvalia maculata* - Aberdeen district, near Aberdeen Road;
- Duvalia modesta* - near Aberdeen Road;
- Duvalia pillansii* - near Aberdeen Road;
- Duvalia reclinata* - near Aberdeen Road; also in Graaff Reinet, Willowmore and Jansenville districts;
- Huernia barbata* - between Willowmore and Port Elizabeth;
- Huernia brevirostris* and var. *intermedia* - Graaff Reinet district;
- Huernia brevirostris* var. *ecornuta* and var. *longula* - near Willowmore;
- Huernia guttata* - between Willowmore and Port Elizabeth;
- Huernia insigniflora* - Graaff Reinet district (?);
- Pectinaria saxatilis* - between Willowmore and Port Elizabeth;
- Piaranthus foetidus* and four varieties - near Graaff Reinet;
- Piaranthus geminatus* - Jansenville district, Klipplaat;
- Piaranthus pillansii* and var. *inconstans* - near Willowmore;
- Stapelia asterias* (var. *lucida*?) - near Willowmore;
- Stapelia desmetiana* - Graaff Reinet and Willowmore districts;
- Stapelia desmetiana* var. *apicalis* - near Aberdeen;
- Stapelia desmetiana* var. *pallida* - between Willowmore and Klipplaat;
- Stapelia engleriana* - Aberdeen district;
- Stapelia gemmiflora* - Graaff Reinet and Willowmore districts;
- Stapelia longii* - Paardepoort in Zuurberg range, between Jansenville and Port Elizabeth;
- Stapelia macowani* - Loots Kloof in Jansenville district;
- Stapelia miscella* - Jansenville district, Klipplaat;
- Stapelia variegata* var. *marmorata* - Steytlerville district;
- Stapelia verrucosa* var. *pulchra* - near Graaff Reinet;
- Stapelia virescens* - Aberdeen district, between Aberdeen and Willowmore;
- Trichocaulon annulatum* - near Klipplaat; and in Willowmore district;
- Trichocaulon piliferum* - near Willowmore.

Cape Province: Western Section of Great Karroo: Beaufort West, Prince Albert and Laingsburg districts.

The visitor to the western part of the Great Karroo should begin his study of the Stapeliads at the 40-acre Karoo Garden of the National Botanic Gardens, at Whitehill, Laingsburg district, where a splendid collection of succulents and other local plants has been developed under the direction of J. Archer. The annual rainfall here is about 6 inches. The Stapeliads collected in the Whitehill area were enumerated in the Transactions of the Royal Society of South Africa, 1931, and we repeat the list here with a few more recent additions. Habitats for these plants in other parts of the western Great Karroo are added in brackets.

- Caralluma arenicola* - rare in Whitehill area; (also near Prince Albert);
- Caralluma* sp. - apparently a natural hybrid between *C. arenicola* and *C. ramosa*;
- Caralluma linearis* - rare; (also Seven Weeks Poort, Prince Albert district);
- Caralluma mammillaris* - rare; (Laingsburg and Prince Albert districts);
- Caralluma ramosa* - occasional on north side of outcropping ridges of Karroo rocks; (Laingsburg and Prince Albert districts);
- Duvalia radiata* var. *obscura* - occasional; (also in Prince Albert district);

- Huernia clavigera* - in rocky crevices and slight shelter;
Huernia distincta - only known in Matjesfontein and Whitehill, and only collected four times;
Huernia pillansii - occasional; (also near Prince Albert);
Pectinaria asperiflora - fairly frequent;
Pectinaria saxatilis - very rare, prostrate on open ground in very shallow soil;
Piarranthus comptus - fairly frequent, hidden at base of low bushes on loose soil; (also near the Gamka River, Beaufort West district; and near Prince Albert and Grootfontein, Prince Albert district);
Piarranthus parvulus - rare; (also at Grootfontein, Prince Albert district);
Stapelia flavopurpurea - Matjesfontein; (also Tanqua Karroo, Laingsburg district);
Stapelia gemmiflora - rare in Matjesfontein, form with almost black flowers; (also in passes of the Zwartberg range, Prince Albert district);
Stapelia parvipuncta - (also near Prince Albert Road; Nieuwveld mountains, Beaufort West district);
Stapelia pillansii - the most frequent *Stapelia* in Whitehill and Matjesfontein, especially abundant near the base of the Witteberg, forming large dense clumps among the bushes; (also at Grootfontein, Prince Albert district);
Stapelia pillansii var. *fontinalis* - Whitehill and Matjesfontein;
Stapelia rufa - occasional; (also near Grootfontein);
Stapelia surrecta - (Tanqua Karroo, Laingsburg district);
Trichocaulon grande - very rare in western Karroo, where it was collected by Mr. Archer for the second time on record;
Trichocaulon pillansii - southern slope of Ngaap Kop: formerly fairly frequent, now almost exterminated by collectors and on account of its edible and supposed medicinal properties.

Additional species recorded from the western Great Karroo include:

- Caralluma pillansii* - between Beaufort West and Willowmore;
Caralluma simulans - near Prince Albert;
Diplocyatha ciliata - near Nieuwveld, Beaufort West district;
Duvalia maculata - Prince Albert Road;
Duvalia parviflora - Witte Poort and Matjesfontein, Laingsburg district;
Duvalia radiata var. *hirtella* - Klein Zwartberg, Laingsburg district; and near Prince Albert;
Hoodia bainii - Prince Albert district: Grootfontein and Gamka River, near Fraserburg Road; Beaufort West district: near Uitkyk;
Hoodia burkei - Willow Fountain, Prince Albert district; near the Gamka River, Beaufort West district;
Hoodia dregei - Doorn River, Prince Albert district; Letjesbosch, Beaufort West district;
Hoodia pillansii - Grootfontein, Prince Albert district;
Huernia brevirostris var. *longula* - Rhenoster Kop, Beaufort West district;
Huernia campanulata - Zeekoegat, 36 miles from Prince Albert;
Huernia campanulata var. *denticoronata* - near Laingsburg;
Huernia humilis - Nieuwveld mountains, Beaufort West district;
Huernia praestans - near Witte Poort, Laingsburg district;
Piarranthus comptus var. *ciliatus* - near Laingsburg; Grootfontein; etc.;
Piarranthus disparilis - under bushes between Ladismith and Laingsburg;
Piarranthus pillansii var. *inconstans* - road between Beaufort West and Aberdeen;
Stapelia asterias var. *lucida* - Witte Poort, Laingsburg district; towards Klaarstroom, Prince Albert district;
Stapelia cincta - Nieuwveld mountains near Beaufort West;
Stapelia engleriana - near Laingsburg; near Prince Albert; Rhenoster Kop, Beaufort West district;
Stapelia flavirostris - New Hantam, Prince Albert district; Rhenoster Kop, Beaufort West district;
Stapelia gemmiflora var. *densa* - Fraserburg Road, Prince Albert district; Beaufort West;
Stapelia gemmiflora var. *hircosa* - Witte Poort, Laingsburg district;

Stapelia grandiflora - farm Kruidfontein, Prince Albert district;
Stapelia hirsuta - a variety near Prince Albert;
Stapelia olivacea - Rhenoster Kop, Beaufort West district; Zeekoegat, Prince Albert district;
Stapelia pillansii var. *attenuata* - Matjesfontein; etc.;
Stapelia rufa var. *attenuata* - Witte Poort; etc.;
Stapelia variegata - Laingsburg district;
Trichocaulon flavum - near Prince Albert;
Trichocaulon piliferum - near Weltevrede and near Prince Albert, Prince Albert district.

Cape Province: Transkeian territories.

The extreme east of the Cape Province, from the Natal border to the Great Kei River near Kentani, is divided into a series of territories (mostly forming a native reserve), Griqualand East, Pondoland, Tembuland and the Transkei proper, having a total area of over 16,000 square miles. The country is undulating, occasionally wild and rugged, but largely fertile and well watered. The summer landscape has been compared to a "piece of crumpled green velvet," in contrast to the brown veld of dryer sections. Few *Stapeliads* have been recorded. *Stapelia fucosa* hails from Pondoland, near Mount Ayliff, at the Griqualand East border. *S. peglerae*, from dry rocky ground near Mqanduli, Tembuland, commemorates the botanical studies of the late Miss Alice Pegler throughout this region; and there are two other *Stapelias* reported from the same locality, *S. asterias* var. *lucida* and *S. glabricaulis*. *S. tsomoensis* recalls the name of a small settlement, Tsomo, in the Transkei, where it is native. A *Huernia*, also localized near Tsomo, may be *H. thureti*.

Cape Province: Great Kei to Fish River.

The south-eastern section of the Cape Province from the Great Kei to the Great Fish River, corresponding approximately to the old colony of Kaffraria, presents a varied vegetation. Here the narrow coastal strip of East Coast forest reaches its southern end near East London; here also the High Veld comes to its southern limit between King William's Town and Bedford; here are some of the largest islands of the temperate rain forest; and here, near the coast in Peddie district, are met the last outstretched fingers of the Karroo. Elevations rise from sea level to 7,800 feet in the Great Winterberg mountains. *Stapeliads* are not prominent in any part of the region, and from the districts of Adelaide, Peddie, Stutterheim, Stockenstrom and Victoria East none at all have been recorded. *Stapelia verrucosa* var. *pulchra* grows in the valley of the Kei, from Komgha (Komgha district) to Waku Station (Cathcart district). It is reported also from the East London district and Queenstown district (Mbumbula mountain, 3,800 feet). *S. glabricaulis* is the only species recorded from Fort Beaufort and King William's Town districts. *Huernia primulina* var. *rugosa* is cited without locality from Queenstown district. Two other species from Queenstown district, *Stapelia flavirostris* (near Queenstown) and *S. desmetiana* (Shiloh or Oxkraal mountains) are both found also near the Babians River in Bedford district. Other species from the Bedford district are *Stapelia conformis* and the var. *abrsa* (Patrys Hoogte near the Great Fish River), *Piaranthus foetidus* and

the var. *multipunctatus* (9 miles east-south-east of Bedford) and *Pectinaria arcuata* (near Bedford). *Stapelia flavirostris* is again reported from the Tarka district, north of the Bedford district, together with *S. olivacea* and *Huernia primulina*, all three from near Tarkastad.

Cape Province: Albany, Alexandria and Bathurst districts.

These three districts form the southern extremity of the Eastern Savanna-like grassveld, but other types of country are freely intermixed with the grassy tablelands. Some forest areas occur near the south coast, with tracts conspicuous for the tree Euphorbias, or for the Acacia scrub, or the rough bush and scrub cover. Elevations range from sea-level to over 2,000 feet in the Zuurberg Mountains. Rains are moderate throughout the year, the annual fall at Grahamstown in Albany district averaging 27 inches. Stapeliads are found at many points. In compiling the following list we have been greatly helped by the advance sheets kindly sent us by R. A. Dyer of his valuable Flora of the Albany and Bathurst Districts, now in preparation.

- Duvalia modesta* - rare in Karroid veld, 8 to 10 miles north-west of Grahamstown;
- Duvalia pillansii* var. *albanica* - vicinity of Grahamstown, but rare;
- Duvalia reclinata* - at several points in Albany Distr., including Bothas Berg and Carlisle Bridge;
- Huernia barbata* - in Karroid veld off Cradock Road, a few miles from Grahamstown;
- Huernia primulina* - in dry areas of Albany Distr., including Fish River Valley, Bothas Berg and Carlisle Bridge; also occasionally with the var. *rugosa*;
- Huernia thureti* - on rocky outcrop near dry scrub in Albany Distr., at Alicedale and on kopjes 20 to 25 miles from Grahamstown on Peddie Road; "tons of it," according to G. W. Reynolds, "on the high grassy ridges in the mist belt near Frasers camp and westwards to Komsfontein and Honey Kop, the grassy environment and heavy moisture from mists seeming to me very unusual for a *Huernia*;"
- Piранthus foetidus* - in the Fish River Valley, Albany Distr.;
- Stapelia asterias* var. *lucida* - Manley Flats, near Grahamstown;
- Stapelia conformis* - at several places in Karroid scrub in Albany Distr., north of Grahamstown, etc.;
- Stapelia desmetiana* - from Mimosa in Alexandria Distr.; and in Albany Distr.: 10 miles from Grahamstown on Kowie West Road;
- Stapelia flavirostris* - Hell Poort and Brak Kloof in Albany Distr.;
- Stapelia glabricaulis* - from near Port Alfred in Bathurst Distr.;
- Stapelia grandiflora* - Mimosa, in Alexandria Distr.; and Port Alfred, in Bathurst Distr.;
- Stapelia macowani* - Albany Distr.: Hell Poort and Bothas Berg;
- Stapelia plantii* - recently recorded from near Grahamstown;
- Stapelia pulchella* - Sandflats in Alexandria Distr.; also from Carlisle Bridge, in Albany Distr.;
- Stapelia senilis* - may be native in the Albany Distr., for it was first cultivated in the Grahamstown Botanic Gardens, whose twenty acres form one of the most luxuriant botanic gardens in South Africa;
- Stapelia verrucosa* - varieties occur in each of the three districts.

The city of Grahamstown is famous for its Albany Museum, of which J. Hewitt is Director. In the Albany Museum Herbarium, of which the Botanist in Charge of the Botanical Survey of the South Eastern Area, C. D. B. Liebenberg, is honorary curator, are preserved the *Stapelia* drawings of Mrs. F. W. Barber, two of which are here reproduced. (Figs. 31 and 32).

Cape Province: Somerset East and Pearston districts.

The districts of Somerset East and Pearston are situated in the south-east corner of the Karroid areas, with fertile farming sections along the Great Fish and Little Fish Rivers, wherever irrigation permits. Elevation above sea-level averages 2,000 feet, with higher mountainous regions to the north, beginning at Boschberg Mountain just above Somerset East. The climate is delightfully dry and cool. Stapeliads occur at a number of points, notably at the Glen Avon Estate, near the Glen Avon Waterfall, a fall of 300 feet on the Little Fish River, seven miles from Somerset East. W. Armstrong van Ryneveld, long an enthusiastic collector in Somerset East, writes us: "The few species that are found in this district grow mostly on the open veld; some you will find under the shelter of bushes. *Huernias*, *Duvalias* and *Piaranthus* grow wedged in between rocks and stones on the open veld."

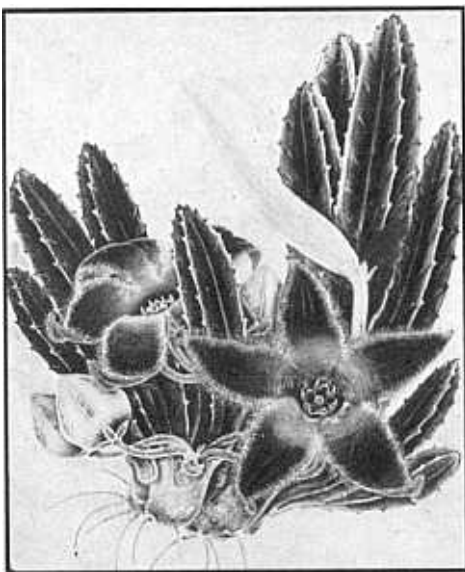


FIG. 31

Drawing of an unidentified *Stapelia*, perhaps *S. desmetiana*, by Mrs. Barber, who wrote of it: "Quite new genus: hab. near Grahamstown; Botha's Hill; near allied to *S. grandiflora*, a very beautiful species."

- Duvalia modesta* - near Pearston; and under low bushes in flat country at Golden Gate, 5 miles south of Cookhouse;
- Duvalia radiata* var. *hirtella* and var. *obscura* - Bruintjes Hoogte, near Somerset East;
- Duvalia reclinata* and var. *bifida* - near Somerset East; and Glen Avon Estate;
- Huernia barbata* - near Sheldon; plentiful on Port Elizabeth Road, 23 miles south of Somerset East;
- Huernia brevisrostris* var. *scabra* and var. *immaculata* - 3 miles south of Somerset East;
- Huernia ocellata* - between Somerset East and Pearston;
- Huernia primulina* - between Somerset East and Pearston, near Bruintjes Hoogte;
- Pectinaria pillansii* - Glen Avon Estate;
- Piaranthus comptus* - Lake Mentz, Somerset East Dist.; and in Pearston district;
- Stapelia conformis* - near Cookhouse Station;
- Stapelia desmetiana* - near Little Fish River; Glen Avon Estate; among prickly pear at Bruintjes Hoogte;
- Stapelia desmetiana* var. *apicalis* - Great Fish River;
- Stapelia flavirostris* - near the Fish River, 2,000 feet; and near Pearston;
- Stapelia grandiflora* - between Somerset East and Cookhouse; Karroo at Bruintjes Hoogte; etc.;
- Stapelia verrucosa* - five varieties near Somerset East; on the slopes of the Boschberg; and at Glen Avon Estate.

Cape Province: Port Elizabeth, Uitenhage and Humansdorp districts.

The area of the two districts of Port Elizabeth and Uitenhage is about 2,500 square miles and it extends along the south coast from the Sundays River to the Gamtoos River, and north to the Somerset East and Jansenville districts, where the Little Winterhoek

and Zuurberg mountains form a natural boundary. The altitude rises from sea-level at Port Elizabeth, across several plateaus and mountain tracts to the Great Winterhoek mountains, whose highest section, the Cockscomb, is nearly 5,000 feet high. Much of the land is occupied by Karroid succulent vegetation, merging into thorn scrub. The railway from Uitenhage to Graaff Reinet runs for hours through stretches of Euphorbias, two to three feet tall, and other succulents, an unforgettable sight in November and December, when the Spekboom (*Portulacaria afra*) is laden with masses of pink flowers. Dr. Schönland has given a very complete enumeration of the flora of these two districts in Memoir No. 1 of the Botanical Survey of South Africa, 1919, to which a few supplementary records have been added since. Stapeliads are represented by sixteen species. These are so closely parallel to those of the areas on the east (Alexandria-Albany-Bathurst) and on the north (Somerset East-Pearston) that we have thought it worth adding to the respective habitats the letters (A.-A.-B.) after the species found also to the east and (S.E.) after those found to the north:



FIG. 32

Drawing of an unidentified *Stapelia* by Mrs. Barber, who wrote of it: "A new species? Found in the neighborhood of Grahamstown."

- Duvalia caespitosa* - near Port Elizabeth (?);
- Duvalia corderoyi* - Redhouse, flowering March, June;
- Duvalia elegans* - Port Elizabeth, March;
- Duvalia pillansii* var. *albanica* - Uitenhage district; (A.-A.-B.);
- Duvalia radiata* var. *birtella* - a form at Redhouse, August;
- Duvalia reclinata* - Redhouse, March; (A.-A.-B. and S. E.);
- Huernia barbata* - Sundays River, north of Uitenhage, April; (A.-A.-B. and S. E.);
- Huernia primulina* - Redhouse, May; (A.-A.-B. and S. E.);
- Huernia thureti* - Port Elizabeth, March; (A.-A.-B.);
- Stapelia ambigua* - Barkly Bridge Station;
- Stapelia ambigua* var. *fulva* - near Uitenhage;
- Stapelia conformis* - Cockscomb mountains; (A.-A.-B. and S. E.);
- Stapelia desmetiana* - near Zwartkops Station, June; Zuurberg, March; (A.-A.-B. and S. E.);
- Stapelia grandiflora* - Redhouse, May; Port Elizabeth, January; (A.-A.-B. and S. E.);
- Stapelia plantii* - near Uitenhage; (A.-A.-B.);
- Stapelia pulchella* - near the banks of the Zwartkops River in the vicinity of Zwartkops Station; sand dunes along the coast south of Port Elizabeth; (A.-A.-B.);
- Stapelia verrucosa* (var. *pulchra*?) - Port Elizabeth, March, April; Bethelsdorp, November; (the var. *pulchra* occurs in A.-A.-B. and S. E.).

All the localities mentioned in this list, except Port Elizabeth, are in the Uitenhage district. It should be noted that Prince Alfred's Park, Port Elizabeth, has a fine collection of succulents, in charge of the Superintendent of Parks, F. R. Long, himself the discoverer of *Stapelia longii* from the Hopewell district. *Stapelia forcipis* is believed to have come from the large private collection of our collaborator, David Pringle, in Port Elizabeth, but its original habitat is unknown.

In the Humansdorp district, westerly along the coast from Port Elizabeth, the only Stapeliad recorded is *Stapelia pulchella*, which is found on sand dunes as it is in Port Elizabeth.

Cape Province: Little Karroo and Coastal districts to the South: Ladismith, Oudtshoorn, Uniondale, Mossel Bay and George. (By C. Luckhoff).

As the coastal plateau lands of the south of the Cape Province rise northwards to the Great Karroo, two principal chains of mountains are crossed. The first is formed by the coastal ranges, including the Zonderend mountains, the Langebergen, and the Outeniqua and Langekloof mountains; the second, or Zwartberg range, runs from near Ladismith to Willowmore. Between the two lies the long plain of the Little Karroo, embracing the districts of Ladismith, Oudtshoorn and Uniondale, and part of the Riversdale district, which will be considered separately. Ascending from the coast, one immediately enters a plateau, of a mean elevation of 2,000 to 3,000 feet, with the dry bracing climate so typical of all the South African plateau regions. The mountains bounding the Little Karroo are of Table Mountain sandstone, and present the flora typical of that formation. The Little Karroo is of Bokkeveld shale, with cretaceous deposits near Oudtshoorn. The Congo Valley, near Oudtshoorn, has long been famous for the depth and fertility of its soil, well adapted to agricultural pursuits. The rainfall, though less than at the coast, is sufficiently regular to make the Little Karroo a prosperous farming district.

In the number and variety of its Stapeliads, the Little Karroo is perhaps second only to Little Namaqualand. Several species extend into the neighboring districts of Mossel Bay and George on the south, and one or two are endemic there.

- Caralluma arenicola* - near Armoed, Oudtshoorn district;
- Caralluma arida* - "Kannaland," Ladismith district;
- Caralluma chlorantha* - Karroo near Klip Drift, George district, 1,800 feet;
- Caralluma mammillaris* - Oudtshoorn district, Calitzdorp;
- Caralluma ramosa* - "beyond Platte Kloof, around the hot springs," probably Ladismith district;
- Diplocyatha ciliata* - near Ladismith;
- Duvalia elegans* - near Calitzdorp;
- Duvalia parviflora* - Ladismith district;
- Duvalia pillansii* - Ladismith district, Amalienstein;
- Duvalia radiata* - Ladismith district; and a plant conforming to Fig. 779 comes from Oudtshoorn district, Congo series;
- Duvalia radiata* var. *obscura* and var. *hirtella* - Ladismith district;
- Duvalia reclinata* - Ladismith district;
- Huernia barbata* - near Ladismith;
- Huernia campanulata* - widespread in Ladismith and Oudtshoorn districts;
- Huernia clavigera* var. *maritima* - near the coast at Mossel Bay; near Ladismith;
- Huernia pillansii* - Calitzdorp; on hills near Oudtshoorn;
- Huernia praestans* - near Ladismith;
- Pectinaria saxatilis* - near Oudtshoorn;
- Piaranthus decorus* - Ladismith district; Oudtshoorn district, Calitzdorp;
- Piaranthus disparilis* - between Oudtshoorn and North Station; Ladismith district;
- Piaranthus parvulus* - Ladismith and Oudtshoorn districts;
- Piaranthus pillansii* - on hills near Oudtshoorn;
- Piaranthus pillansii* var. *fuscatus* - 9 miles on road from Oudtshoorn to George;
- Stapelia asterias* var. *gibba* - on the road from Ladismith to Laingsburg;

- Stapelia asterias* var. *lucida* - same locality; also Great Brak River and Ezeljagtspoort in George district;
Stapelia bijliae - near the coast in Mossel Bay district, near Great Brak River;
Stapelia engleriana - Karroo, in Ladismith district;
Stapelia flavirostris - between George and Oudtshoorn; on Huis River Pass, between Calitzdorp and Ladismith;
Stapelia gemmiflora - between Ladismith and Muiskraal; near Railway Station in Uniondale;
Stapelia gemmiflora var. *bircosa* - between Ladismith and Muiskraal;
Stapelia rufa - Ladismith district, widespread;
Stapelia rufa var. *attenuata* - between Ladismith and Muiskraal; and other points;
Stapelia rufa var. *fissirostris* - 10 miles south of Ladismith;
Stapelia variegata - near the coast at Mossel Bay;
Stapelia verrucosa var. *pulchra* - rocky hills near Haarlem, Uniondale district;
Trichocaulon piliferum - "Karoo, the other side of Attaqua Kloof," Oudtshoorn district; also at Oudtshoorn; and in Ladismith district, Amalienstein.

Cape Province: Riversdale district.

The Stapeliads of Riversdale district have been recorded with unusual completeness in the admirable survey of the area published by Dr. J. Muir of Riversdale (Botanical Survey of South Africa, No. 13. 1929). The district lies along the south coast, between Swellendam and Mossel Bay. It is divided by the belt of the Langeberg range into a wide strip of rhenoster veld to the south, which merges into the sand dunes along the coast, and

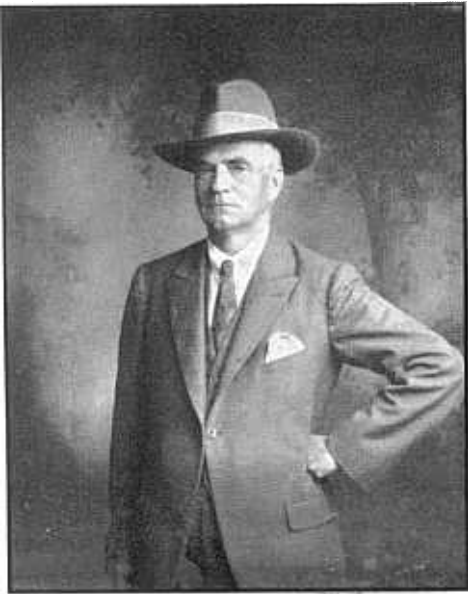


FIG. 33

Dr. John Muir.

a narrower parallel strip of the Little Karroo to the north. South of the Langebergen, *Stapelia variegata* is common on the hills and flats, from 100 to 800 feet elevation, flowering from May to August. It is worth noting that the rainfall in this southern section is sufficiently regular for the flowering period of the plants to be relatively constant from year to year. In the Karroid areas plants flower very irregularly after rains and it is impossible to assign accurate flowering dates to individual species.

Another Stapeliad growing south of the Langebergen is *Duvalia elegans* var. *seminuda*, from near the railway line, 2 miles west of Riversdale. And recently *S. divaricata* has been rediscovered near Heidelberg (Riversdale or Swellendam district). *Caralluma arida*, ascribed by Masson to "Kannaland" (Riversdale or Ladismith district), has not been rediscovered.

North of the Langebergen half a dozen Karroo species are known. *Caralluma ramosa* and *Trichocaulon piliferum* are common on plains and hills (seen flowering from May to August). *Piarranthus pillansii* is occasional, among detritus of dried leaf fragments in shelter of shrubs in loose soil. And there are three more *Stapelias*, all growing on hills and flats at between 1,000 and 1,500 feet elevation: *S. asterias* var. *lucida* (seen flower-

ing May and June); *S. rufa* and the var. *attenuata* (seen flowering March to May); and *S. gemmiflora* and the var. *hircosa* (seen flowering March and April). The only *Huernia* recorded in the district is *H. praestans*, near Muiskraal.

Cape Province: Western Province and Coast Belt. (By C. Luckhoff).

The Western Province and coastal belt is of low altitude, traversed by flat-topped mountain ranges 3,000 to 5,000 feet elevation, extending from near Port Elizabeth in the east to Clanwilliam in the north. These mountains are of sandstone formation (Table Mountain Sandstone), and comprise the chief feature of the Cape system, being skeleton remains of what was once a continuous plateau. Underlying the sandstone strata are layers of Malmesbury, Bokkeveld and Witteberg shale, which come to the surface in the valleys and support a very distinctive vegetation (rhenosterbos).

The climatic conditions of the Western Province and coast belt are influenced by ocean winds and the presence of the mountains, which are well clothed with vegetation. The rainfall varies from 10 to 40 inches.

The mountains of the Cape system flank the Great Karroo along its western and southern borders. Thus to the west we have the Bokkeveld Mountains, the Cedarbergen, the Cold Bokkeveld Mountains, the Cold Bokkeveld Karroo, the Witzenbergen, and the Ceres Karroo bordering the western and Tanqua part of the Great Karroo. To the south we have the Hex River Mountains, the Anysbergen, and Klein Swartbergen bordering the Klein Roggeveld and Moordenaar's Karroo, whilst extending eastwards the Groot Swartbergen flank the Ghoup and Great Karroo proper. Further east the southern limits of the Great Karroo are not so well defined by great mountain ranges, the Karroo system passing into the Cape system in a series of extensive plateaus.

Cape Province: Western Province and Coast Belt: Clanwilliam, Piquetberg and Ceres districts.

Travelers from Capetown to Ceres may see two landmarks in the history of the Stapeliads, for after leaving Wellington the old road winds through Bain's Kloof Pass, a monument to the engineering skill of Andrew Geddes Bain, father of Thomas C. Bain, who discovered several species about 1875, and further on the road passes through Mitchell's Pass at the south end of the Witzenberg Mountains, named in honor of the picturesque Burgomaster of Amsterdam, Nicolaas Witsen.

Stapelia hirsuta var. *patula* and var. *longirostris* are found in Bain's Kloof, on the Worcester side, and in Mitchell's Pass near Ceres. In the Bokkeveld occur *Caralluma marlothii* (stony places near Swartkops Drift), and *Diplocyatha ciliata* (Karoo, between Roggeveld Mountains and Paardeberg). Other species in the Ceres district are *Caralluma incarnata* (Karooport, north of Ceres), *C. mammillaris* (Ceres Karroo), *Stapelia dwequensis* (Dwequa River), *S. parvipuncta* var. *truncata* (farm Tulpfontein, 40 miles north of Karrooport), and *S. surrecta* (Ceres Karroo).

In Piquetberg district, besides *Stapelia variegata*, are recorded *Caralluma incarnata*, near Verloren Valley, and *Stapelia immelmaniae*, on the Piquetberg.

The list from the Clanwilliam district embraces sixteen plants:

Caralluma dependens - near Clanwilliam; Olifants River;

Caralluma incarnata var. *alba* - near Lambert's Bay;

Caralluma intermedia - Olifants River;
Caralluma inversa;
Caralluma mammillaris - near Clanwilliam; rocky hills near Olifants River;
Hoodia bainii - lower mountain slopes 2 miles west of Doorn River bridge;
Huernia guttata;
Huernia reticulata - rocks near Olifants River;
Luckhoffia beukmanii - Pakhuis Mountains, on road between Clanwilliam and Calvinia;
Stapelia acuminata - near Clanwilliam;
Stapelia arenosa - near Clanwilliam;
Stapelia erectiflora - near Clanwilliam; Karroo, 6 miles beyond Cederbergen;
Stapelia glanduliflora and var. *emarginata* - near Clanwilliam;
Stapelia nouhuysii - van Puttersvlei, near Lambert's Bay;
Stapelia revoluta - 1 mile south-east of Clanwilliam; Karroo, beyond North Olifants River;
Stapelia stultitoides - near Clanwilliam.

Cape Province: Western Province and Coast Belt: Malmesbury, Paarl, Stellenbosch, Cape, Wynberg, Simonstown, Tulbagh, Worcester, Montagu, Robertson, Caledon, Bredasdorp, and Swellendam districts.

The predominance of *Stapelia variegata* and *S. hirsuta* in the early records of Stapeliads arose quite naturally from the extent to which the two overshadowed all other species within 100 miles of Capetown. *S. variegata* grows on Cape Point, nearest of all

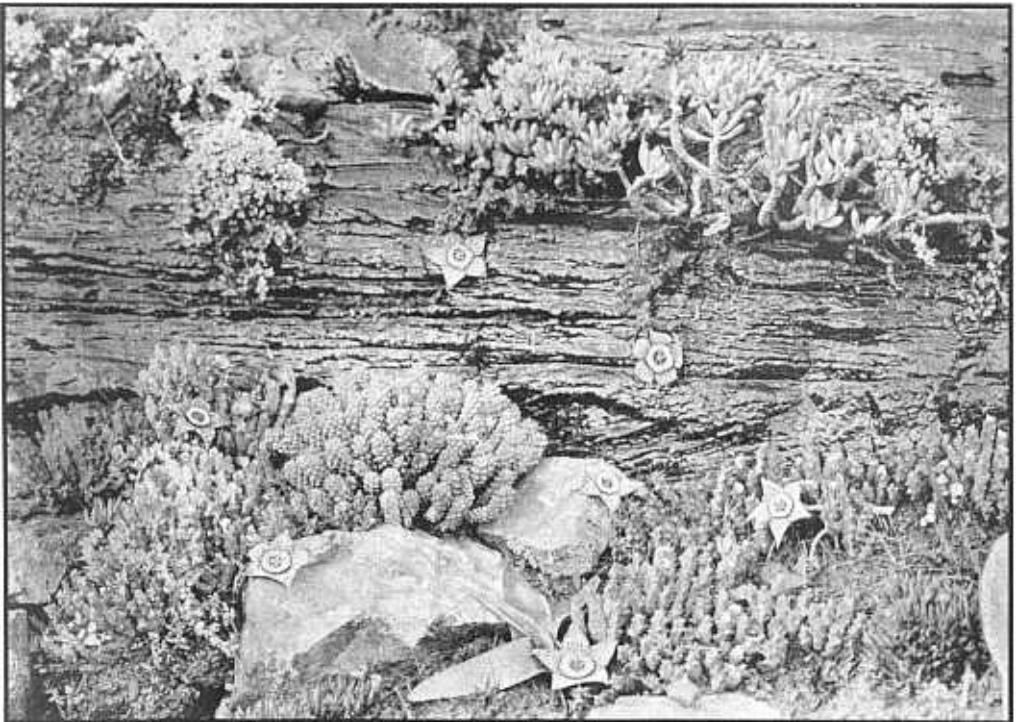


FIG. 34

Stapelia variegata Linnaeus

Cliff on northern side of Table Mountain, 1050 feet elevation, May. Photo by R. Marloth, from Flora of South Africa, 1932.

Stapeliads to the Cape of Good Hope. In the Cape, Stellenbosch, Wynberg, Simons-town and Bredasdorp districts it is the only species recorded, and it is celebrated for its luxuriant growth and the wide range of its varieties on Table Mountain, Lion's Head, Signal Hill, Camps Bay, Robben Island, Dassen Island, and at many other points. It occurs likewise in Caledon, Paarl, Robertson, Malmesbury and Worcester districts, which are also headquarters for the numerous varieties of *S. hirsuta*.

The plains of the Western Province, from Piquetberg to Swellendam, are of rich deep Malmesbury shale, and it is here that the wheat, fruit and wine industries of the Western Province are chiefly fostered. Beyond Worcester the slopes of the Hex River mountains suddenly present the buttress of the Karroo beyond. The traveler who goes north or west from Capetown will begin to meet other Stapeliads within 60 or 75 miles, and within about 130 miles he may have seen all of the three other species known to Linnaeus and his son, and described in their works up to 1781. These are *Caralluma incarnata*, from near Saldanha Bay, Malmesbury district; *C. mammillaris*, frequent on the Karroo side of Worcester; and *Trichocaulon piliferum*, which is found (an outlier from its usual habitat slightly further east) in the Barrydale and Warmwaterberg section of the Swellendam district. Other species from the south-west districts of the Cape Province are the following:

- Caralluma incarnata* var. *alba* - sandy places near Hopefield, Malmesbury district;
- Caralluma pillansii* - Donker Kloof, easterly part of Robertson district; and Hex River Pass, Worcester district;
- Caralluma ramosa* - near Barrydale, Swellendam district;
- Duvalia elegans* - near Ashton, Montagu district;
- Duvalia radiata* var. *hirtella* - Touws River, Worcester district;
- Duvalia radiata* var. *minor* - Worcester district;
- Duvalia radiata* var. *obscura* - Montagu district;
- Huernia brevirostris* - near Barrydale, Swellendam district;
- Huernia brevirostris* var. - Touws River, Worcester district;
- Huernia clavigera* - Barrydale, Swellendam district;
- Huernia witzenbergensis* - lower slopes of the Witzenberg, Tulbagh district;
- Piранthus decorus* - Barrydale, Swellendam District;
- Stapelia asterias* (var. *lucida*?) - Huis River Berg, Worcester district;
- Stapelia gemmiflora* and var. *hircosa* - Swellendam district;
- Stapelia nudiflora* - Southey's Pass, Montagu district;
- Stapelia vetula* - Hex River mountains, Worcester district.

Species without known habitats.

No precise locality is recorded for the following species. Some of them should probably be regarded as hybrids:

- Caralluma torta* - Southern Arabia or Socotra;
- Caralluma valida* - probably Zambesi or Transvaal;
- Duvalia angustiloba* - Cape Prov.: Central region?
- Duvalia emiliana* - South Africa;
- Hoodia barklyi* - "Karoo;"
- Huernia albomaculata*;
- Huernia decemdentata* - South Africa;
- Huernia transmutata*;
- Huernia venusta* - "dry places in the Karroo;"
- Piранthus globosus*;

Stapelia asterias (type) - "Karoo;"
Stapelia concinna (type) - "Karoo;"
Stapelia deflexa (type) - South Africa;
Stapelia fuscopurpurea - South Africa;
Stapelia irrorata - South Africa;
Stapelia lepida - South Africa;
Stapelia mutabilis - South Africa;
Stapelia maccabeana - South Africa;
Stapelia margarita - South Africa;
Stapelia sororia - South Africa;
Stapelia stricta - South Africa;
Stapelia verrucosa (type) - South Africa.

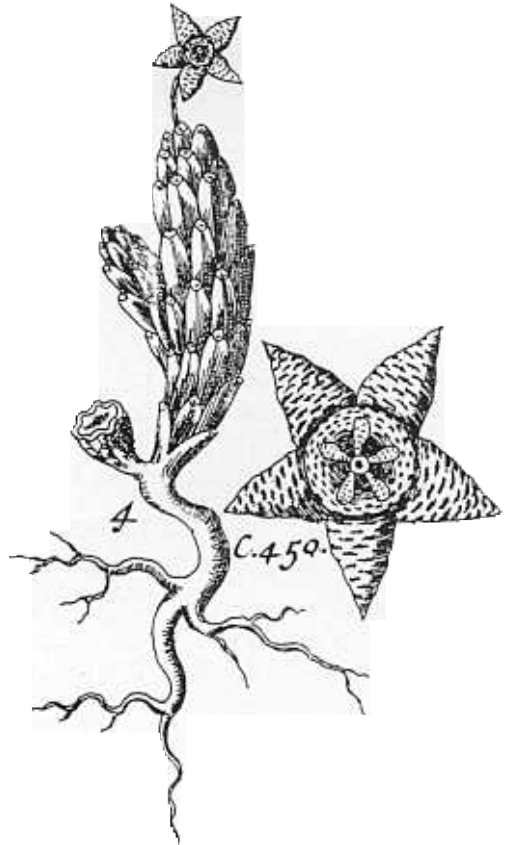


FIG. 34-A

"The small Cape Fritillary"

A fanciful figure by Jacob Petiver, probably intended to represent *Stapelia variegata*. The two plate numbers refer to distinct editions, in which the same plate was used: Fig. 4 to *Gazophylacii Naturae et Artis*, Decas II, London, 1709, and C-450 to *Opera historiam naturalem spectantia*; or *Gazophylacium*, 1764.

CHRONOLOGICAL NOTES

The Native Tribes.

The first collectors of Stapeliads were doubtless the natives of the different countries in which these plants grow. From time immemorial they have sought out certain species for food during periods of drought, or for their medicinal qualities, or for some reputed magic virtue. Thus the North African *Caraluma dalzielii*, frequently planted in corners of the yam fields of Dahomey, is still believed to counteract the hoodoos of malevolent passers-by; while the name of *C. hottentotorum* perpetuates the reputation of that plant's medicinal properties among the Hottentots of Little Namaqualand.

We reproduce from a beautiful book by Miss M. Wilman (Rock Engravings of Griqualand West and Bechuanaland, 1933) a Bushman engraving which Miss Wilman identifies as a *Stapelia*. The origin of the Bushman engravings is a matter of conjecture. Dr. Emil Holub considered them to be between 120 and 600 years old. He based the more recent date on information given him by Bushmen, whose fathers and grandfathers had been among the last imitators of the old classical designs. Some later investigators have claimed for the engravings a much greater age. Miss Wilman inclines to the acceptance of Holub's estimate of 600 years for the oldest surviving engravings, though the origin of the art may well have been much older. The engraving we reproduce was found on a rock in School-

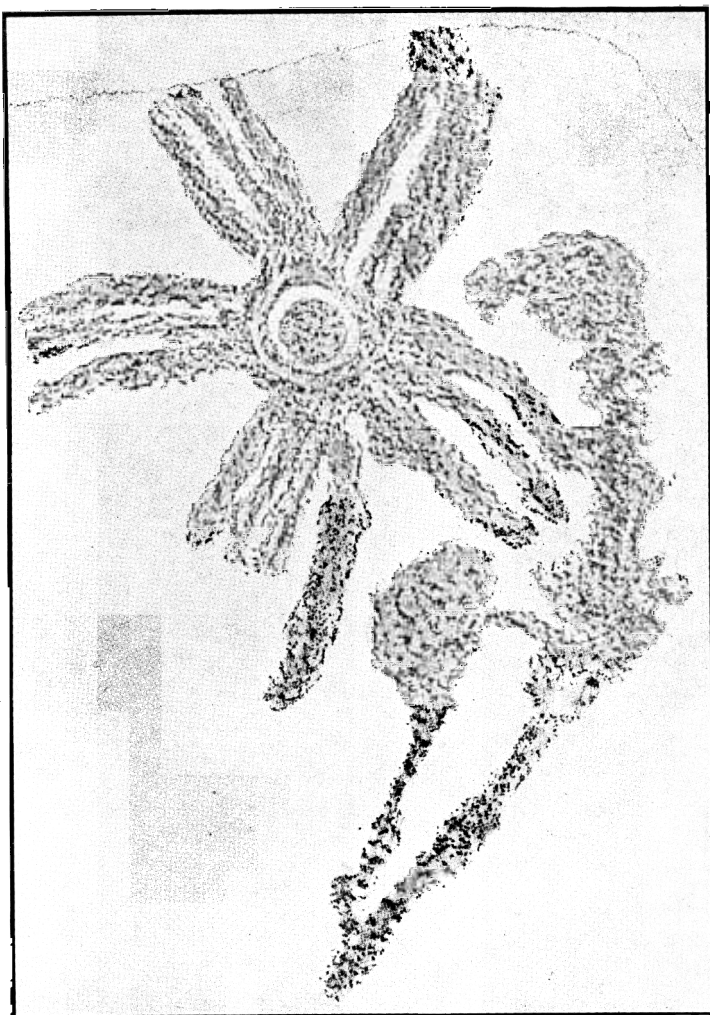


FIG. 35

Rubbing of an old Bushman engraving, by Miss M. Wilman, from The Rock Engravings of Griqualand West and Bechuanaland, 1933. The upper portion is lightly pecked, the base fairly deeply pitted. About one-third actual size.

plaats, on the Vaal River near Kimberley. Miss Wilman attributes it to the last period of the classical style, dating shortly before the advent of decadent imitations, and she identifies it as representing *Stapelia flavirostris*, a common plant in the district. It is interesting to learn that engravings of plants are very infrequent as compared with those of animals or human beings, or subjects related to the native forms of worship, such as the circular figure of the sun with its ray-like projections.

1624-1639—Justus Heurnius.

In Appendix A we have told something of the story of Justus Heurnius (1587-1652), the Dutch missionary from Leyden, who sailed for the Dutch Indies in 1624 full of enthusiasm and returned in 1639, a sadder and a wiser man. He was the first collector of Cape plants and his inclusion in his little collection of *Stapelia variegata* gives this species the distinction of having been among the very first South African plants to become known in Europe.

1644—van Stapel's edition of Theophrastus.

Fritillaria crassa promontorii
bonæ spei.

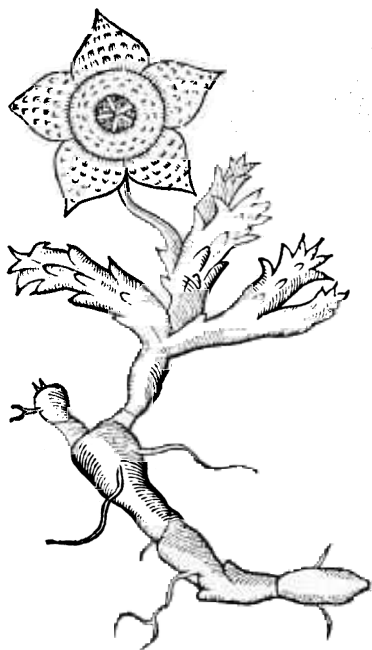


FIG. 36

"*Fritillaria crassa*." From van Stapel's edition of Theophrastus: *De historia plantarum libri decem*, Amsterdam, 1644.

Johannes Bodaeus Stapelius (or van Stapel) was a physician, who graduated from the medical course at Leyden University on May 3, 1625, and established himself as a practitioner in Amsterdam. He died in 1636 and is spoken of as having been a learned young man, with a wide knowledge of Latin and Greek and a special devotion to Botany. His untimely death prevented him from completing his great work, *Theophrasti Historiae Plantarum Libri X*, which was brought out by his father, Egbert Bodaeus Stapelius in Amsterdam, 1644.

The description of *Stapelia variegata* from this work follows. The reference to a tuberous root may have been one reason why the plant was classed as a *Fritillaria*, which is a sort of Lily. Another possible reason is suggested by James Britten, who says there is a superficial resemblance between the appearance of the flower of *S. variegata* and that of *Fritillaria meleagris*.

"*Fritillaria crassa* seems to be a kind of *dentil-laria* from the Cape of Good Hope or Soldanica. Instead of leaves it has excrescences the length of a finger, of succulent thickness, with angles broken out like rocks, and ending in a point. These leaves (stems) at the tip tend to a bluish purple and lower down they are green, and to them is affixed a five-fold flower, consisting of thick leaves (lobes) pointed at the ends, which surround the corolla (annulus) at the middle, are broad where they

touch it and at the circular edge verge to a point. The corolla (annulus) has a cavity within, in which another sort of floret is seated, consisting of five pointed little leaves (corona segments), dark at the tips, the rest yellow, with several purple stamens at the centre. The color of the flower outside is dull purple, inside the base is yellow sprinkled with dark spots, on the leaves (lobes) as well as on the corolla (annulus). The stem (pedicel) with which the flower is joined to the leaves (stems) is marked with purple streaks, and is scarcely half a finger in length. The tuberous white roots adhere to the leaves by a small appendage (!). The plant is almost inodorous (!). It grows in sandy mountainous places."

ÆTHIOPIA.



There grow wild upon the Mountains, and in the Valleys, and on the banks of the Rivers, many other sorts of Plants; as among the rest a peculiar sort of Tulips, *Sempervive*, *Fritillaria*, or Speckled Lillies, Penny-Wort, or Dragon-Wort with sharp pointed Leaves, Sorrel with knotted Roots, and white Blossoms.

FIG. 37
"Fritillaria"

From Dapper's Description of Africa, 1668; reproduced from Ogilby's Africa, 1670.

1668-1670—Dapper and Ogilby.

Heurnius' drawing of "*Fritillaria crassa*" in van Stapel's edition of Theophrastus did not pass unnoticed. There is an extraordinary adaptation of it in Dapper's Description

of Africa, Amsterdam, 1668, which reappears unchanged in Ogilby's Africa, London, 1670.

Olfert Dapper (1636-1689) was a prolific Dutch geographical writer, who assimilated into his works the diaries and other accounts of contemporary travelers the world over. He gave his generation a most comprehensive picture, in words and engravings, of many countries to the remotest parts of Asia and Africa. His illustrations are excellent, those of plants being freely redrawn from original sources. Many are simple and accurate, a few much more elaborated. One of the most fanciful happens to be the adaptation of the Heurnius drawing. The artist has reversed the *Stapelia* with very minor modifications, has added a second flower, and then has given his imagination full play as to the local scenic background and animal life. The result remains unrivaled, so far as *Stapelias* go, except by Dr. Thornton, in whom Dapper would surely have found a kindred spirit.

John Ogilby (died 1676), who paid Dapper the compliment of reproducing his *Stapelia* extravaganza without the change of a line, was a dancing teacher and Master of the Revels to King Charles II of England. Late in life he lavished his energies on the publication of elaborate geographical books, in which he spoke of himself as "busy exploding Old Tales and Hearsays and collecting better modern authority and undoubted truth." Whatever we may think, from the point of view of "undoubted truth," of the Dapper picture, at least Ogilby's quaint description of the plant, taken from the Latin of van Stapel or at second hand from Dapper, is faithful enough: "The Fritillaria hath in stead of Leaves, Sprouts of a finger's length, thick and juicy, with sharp and round broken edges like Teeth, of a pale purple above and underneath green: At the Leaves comes a flower that hath five limber Leaves, sharp at the ends, with a high Crown or Tuft in the middle, hollow within, inclosing another flower which hath also five Leaves, all yellow, but of a dark brown at the ends, with some very red Standards in the middle: this Plant hath no smell, and grows upon barren and sandy Mountains."



FIG. 38

Stapelia hirsuta var. *patula* N. E. Brown x 0.33
From Commelin's Hort. Med. Amst. Pl. Rar., 1715.

1687-1753—From *Fritillaria* to *Stapelia*.

After the publication of van Stapel's book, the inappropriateness of the name *Fritillaria crassa* for *Stapelia variegata* gradually began to be manifest. But what else to call it was a problem.

Botanical nomenclature in the second half of the 17th century was in some confusion and it is at times hard to follow the methods adopted by different botanists to name and describe their plants. Generic names were taking form, and were specially emphasized and defined by the French botanist, Joseph Pittou de Tournefort (1656-1708). But what we call specific names were little more than adjectival differentiations and frequently were extended to form a considerable sequence of words, amounting virtually to a definition of the species. It is true that a binary nomenclature was foreshadowed in the works of Kaspar Bauhin and others from the beginning of the 17th century, but no such system was generally adopted before Linnaeus.

During the period of the pre-Linnaean systematists, different men were building up botanical classifications based on different details of plant structure rather than on a comprehensive study of the entire plant. Thus Tournefort and the German "Rivinus" (Augustus Quirinus Bachmann, 1652-1725) concentrated primarily on the form of the corolla in each species. Robert Morison (1620-1683), a botanist of Scotch birth, began about 1680 the publication of a system, based on the external form of plant fruits, which he called seeds.

Paul Hermann (see Appendix B), a follower of Morison, in his *Catalog of Plants in the Leyden Gardens*, 1687, called *Stapelia variegata* "*Apocynum humile aizoides siliquis erectis*." Other botanists followed suit. Among these, in 1688, was John Ray (1627-1705), theological student, scientist, zoologist, botanist, who realized the importance of the *inner structure* of seeds and observed the difference between embryos with two cotyledons, or seed leaves, and those with only one or none; and, in 1696, Leonard Plukenet (1641-1706), Queen's botanist to Mary II.

R. Bradley, professor of botany at the University of Cambridge, writer of the first work devoted wholly to succulents, the *History of Succulent Plants*, 1716-1727, explains the reference of the Stapeliads to *Apocynum* by saying: "When the blossom is past there succeed long Cods, which contain seeds resembling those of an *Apocynum*, or Dogsbane, of a chestnut color, being pointed with a down or cotton-like substance."

The Stapeliads were transferred to the genus *Asclepias*, where they properly enough belonged, by Robert Morison himself in the last volume of his *History of Plants*, published after his death, 1699. Tournefort in 1703 and Caspar Commelin (see Appendix B) in 1715 continued this arrangement.



FIG. 39
Linnaeus.

The first to place the Stapeliads in a distinct genus was Heinrich Bernhard Ruppius (1688-1719) in the *Flora Ienensis*, Jena, 1718. He established the genus *Crassa* and called *Stapelia variegata* and *S. hirsuta* by the names of *Crassa Rivini* and *Crassa minor*, respectively. The name *Crassa* meant "succulent," and *Rivini* was in honor of A. Q. Bachmann, mentioned above.

A most interesting early generic name was coined by Laurens Heister (1683-1758), Professor of Anatomy and Botany at the Academy in Helmstedt, Germany, who was in charge of the Botanical Gardens of the Academy. In 1730 Heister printed a catalog of the "rare and medicinal plants" grown by him, which included *Stapelia variegata*, *S. hirsuta* and a cristate plant of the former. He separated his two species from the genus *Asclepias* because, as he wrote, their "leafless, angled, succulent stems" seemed completely distinct, and he established a new genus to provide for them, which he called *Stisseria*, in honor of I. Andr. Stisser, the founder of the botanical gardens, who, Heister continues, had made a very fine drawing of *S. variegata* in his "curious botany."

The great Swedish botanist, Linnaeus (1707-1778), finally established the genus *Stapelia* in his *Critica Botanica*, 1737 (see p. 409). But it is worth noting that two years previously, in the first edition of the *Systema Naturae*, *Regnum Vegetabile*, Leyden, 1735, Linnaeus had adopted Heister's name of *Stisseria*. He now made the change to *Stapelia* as stated and Dr. Marloth says that "Otto Kuntze, of reforming fame, described this action as 'one of the numerous instances of abuse to which the great Linnaeus subjected his contemporaries if they dared not to accept his system of plants,' and attempted to re-introduce the original name (*Revisio generum*, 1891). Fortunately the Vienna Botanical Congress of 1905 prevented this upheaval by fixing the first edition of Linnaeus' *Species Plantarum*, 1753, as the starting point of our nomenclature."

1696-1738—Pre-Linnaean Stapeliads.

The earliest mention of *Stapelia hirsuta* occurs in Plukenet's *Almagestum botanicum*, London, 1696. The plant is there listed as an *Apocynum* and called *Apocynum cauliculis longissimis, denticulis ravioribus*, or "Dogsbane with very long stems and fewer teeth" (that is, fewer teeth than in *S. variegata*). In Appendix B will be found an account of the history of *S. hirsuta* and of two other pre-Linnaean Stapeliads, *Caralluma incarnata* and *C. mammillaris*. These three species, as well as *S. variegata*, were all figured in the *Decades of Rare African Plants*, 1738, by Johannes Burman (1707-1780), Professor of Botany at the University of Amsterdam, and Burman was the first botanist to adopt Linnaeus' generic name, *Stapelia*. When Linnaeus came from Sweden to Amsterdam in 1735 he lived a year in Burman's house and it is possible that the name was decided upon at that time.

1761-1763—Forsk.

The first Stapeliads discovered after the four species known to Burman in 1738 were collected a quarter of a century later by Peter Forskal (1736-1763). Linnaeus recommended this young Swedish naturalist to Frederick V of Denmark, when the latter was planning an expedition to Egypt, Arabia and India, to be headed by Karsten Niebuhr, a German traveler. It was an ill-fated expedition, for every member of the small party, except Niebuhr, died on the journey: first the philologist, then Forskal, who con-

tracted the plague in Arabia, then the artist, and finally the surgeon. Niebuhr reached Bombay entirely alone and eventually got back to Copenhagen in 1767. Later he published the works of his companion, Forskal, in a series of books, including the *Flora Aegyptiaco-Arabica*, 1775, and *Icones Rerum Natur.*, 1776. Forskal collected five *Stapeliads*, but his descriptions were fragmentary and only two, now known as *Caralluma quadrangula* and *C. subulata*, have been satisfactorily identified.

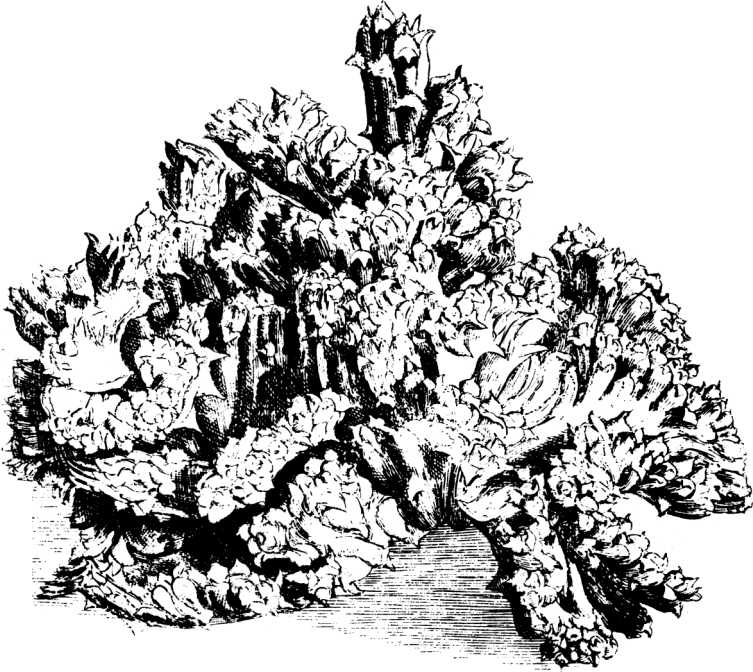


FIG. 40

Crested plant of *Stapelia variegata*

From J. G. Volckamer: *Flora Noribergensis*, 1700.

1700—The cult of *Stapelia* crests.

In the first half of the 18th century there developed considerable interest among fanciers regarding cresting plants of *Stapelia variegata*. Fig. 41 is reproduced from a fantastic drawing of a plant in full flower from Johann Wilhelm Weimann's *Phytanthoza Iconographia*, 1737-45. The story of the Variegata crests may be traced back step by step to the beginning of the century. In 1733, Philip Miller, Gardener to the Worshipful Company of Apothecaries at their Botanic Gardens in Chelsea, London, in his *Gardeners Dictionary* gave a short account of a plant he called "the African Swallow-wort with crested leaves, commonly called the Cockscomb Fritillaria." Miller may have heard of this crest from the 1730 catalog of Laurens Heister, cited on the preceding page; and Heister appears to go back to Boerhaave's *Index Hort. Lugd. Bat.*, 2nd Ed., 1720. In that work Boerhaave listed a plant he called *Asclepias africana aizoides, folio compresso, digitato et cristato*, which was certainly a Variegata crest and which derived in turn from Johann Georg Volckamer's *Flora Noribergensis*, Nuremberg, 1700. Volckamer called his crest *Apocynum humile aizoides, monstruosum*, and figured it in the



plate reproduced here as Fig. 40. We believe this plate to be the source of the general cult of crested Stapeliads, which still flourishes vigorously at the present time. While crests are always rare, they occasionally occur under natural conditions as well as in cultivated plants. Amongst the most curious are those of the spineless-stemmed *Trichocaulons*. "Funnily enough," writes H. Herre, "I know one place in Little Namaqualand, where I can always find some nice *Trichocaulon* crests, whereas everywhere else I go they are extremely rare."

FIG. 41

Stapelia variegata Linnaeus

Plant with cresting stems. From Johann Wilhelm Weimann: *Phytanthoza* Iconographia, 1737-45.

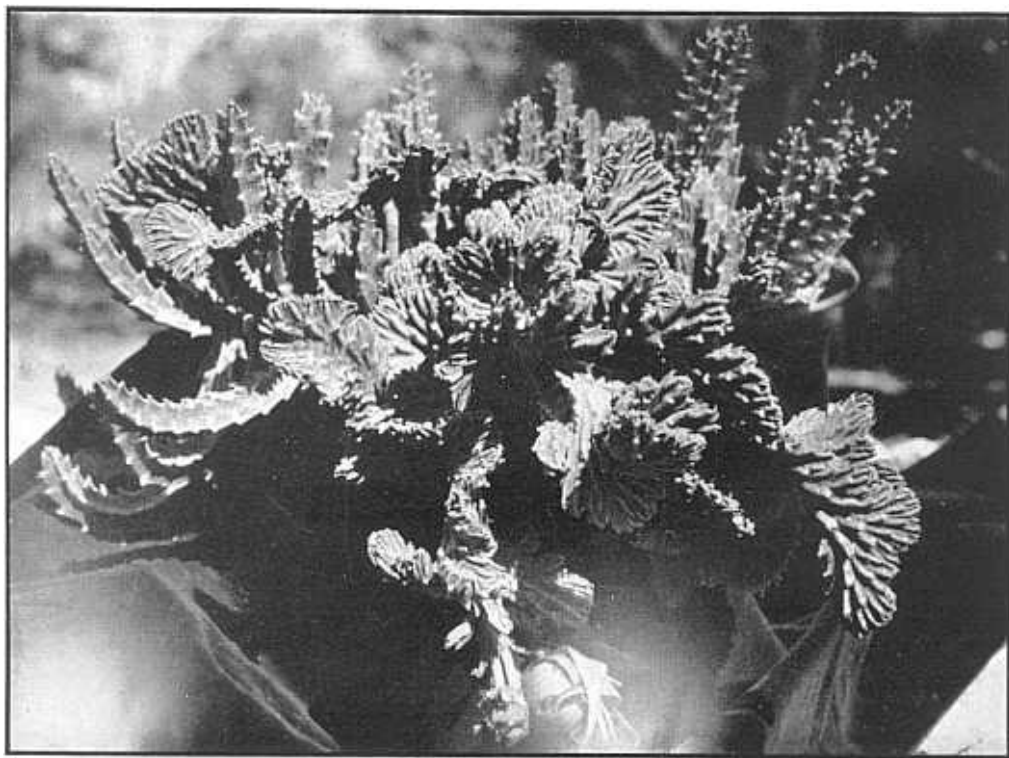


FIG. 42

Stapelia schinzii Berger et Schlechter

Plant with cresting stems. Photo by E. B. W. Schoenfelder.

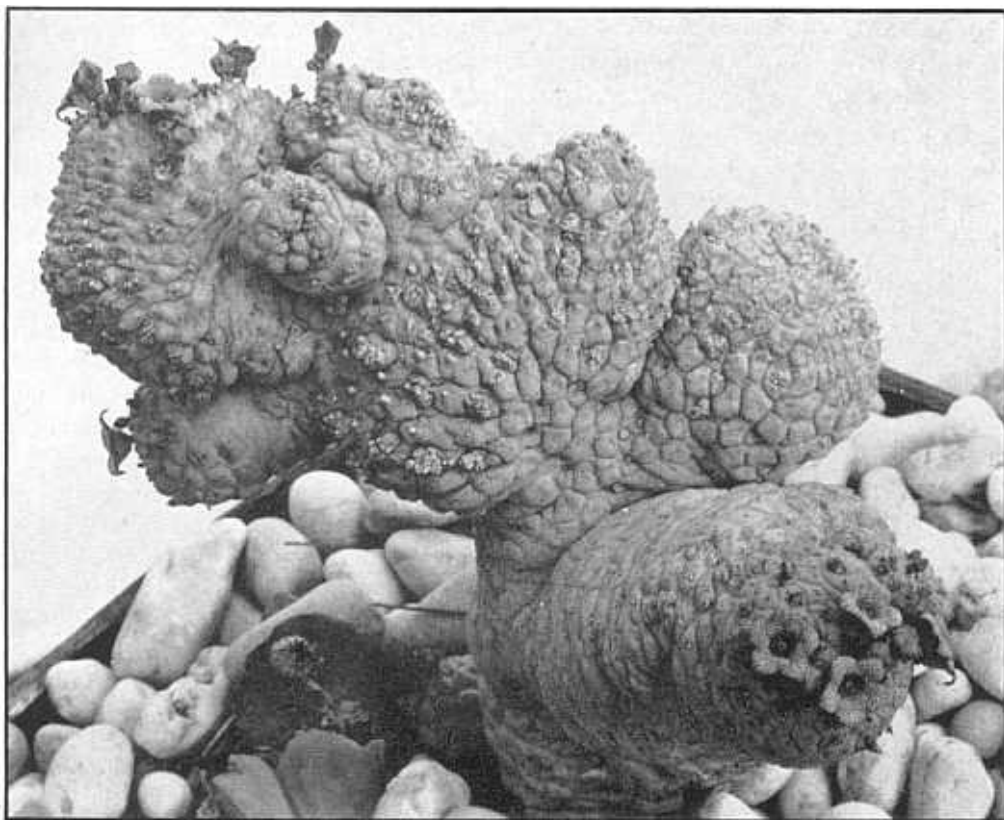


FIG. 43. *Trichocaulon cactiforme* N. E. Brown
Photo by H. Herre of a flowering crest in the collection of M. Otzen, Capetown.



FIG. 44. A cristate *Trichocaulon*, growing wild among rocks near Steinkopf-Maerpoort, Little Namaqualand.
Photo by H. Herre.

1772-1775—Thunberg.

Karl Peter Thunberg (1743-1828) was a Swedish naturalist, a pupil of Linnaeus. Eager for botanical exploration, he worked his way to South Africa as assistant surgeon on a vessel of the Dutch East India Company and reached the Cape in April 1772. He remained in South Africa nearly three years and his stay almost exactly coincided with the duration of Francis Masson's first visit. For part of the time the two traveled together, sometimes under the guidance of the venerable South African botanist, Johann



FIG. 45
Karl Peter Thunberg

Andreas Auge (1711- c.1805). Thunberg's journeys were very extensive, when we consider that he had no financial backing and that the trails of the day were very primitive. "Without a blush," he wrote, "I frankly confess that there never traveled a poorer lover of flowers than I, yet never one more ardent." He managed to overcome all difficulties and today his account of his travels, published in 4 volumes in 1788-1793, may be read in translations in English, French and German. His *Flora Capensis*, based on his own collections, enumerates 3,100 species. This work was published in parts in 1807, 1813, 1818 and a complete edition by J. A. Schultes appeared in Stuttgart in 1828. It won for Thunberg the distinction of being considered the father of South African botany. On leaving the Cape, Thunberg visited Japan and other Eastern lands, and on his return to Sweden he was appointed, 1783, to the chair at the University of Upsala which Linnaeus the father and Linnaeus the son had occupied before him. He died in 1828, crowned with honors, an honorary member

of not less than 66 scientific societies in all parts of Europe. In the field of the Stapeliads, he knew Burman's species, *Stapelia hirsuta*, *Caralluma incarnata* and *C. mammillaris*, and discovered *Diplocyatha ciliata*, *Pectinaria articulata* and *Trichocaulon pili-ferum*, besides an unidentified species which he called *Stapelia fasciculata*. He is sometimes said to have listed 8 Stapeliads, but a plant he called *Stapelia caudata* is now classified as a *Brachystelma*, a genus belonging to another tribe of Asclepiads.

1772-1796—Masson.

The first visit to the Cape in 1772 of Francis Masson (born, Aberdeen, 1741; died in Montreal, Canada, 1805) marks a new era in the study of the Stapeliads. As he himself tell us: "The curious productions of the Cape had been too much neglected until the year 1771, when Captain Cook returned from his first voyage around the globe, and landed the Naturalists who accompanied him at the Cape Town; they were much

gratified by the treasures they met with, and in consequence of the observations they then made, Sir Joseph Banks, on his return to England, suggested to His Majesty the idea of sending a person, professionally a gardener, to the Cape to collect seeds and plants for the Royal Botanic Gardens at Kew; His Majesty was graciously pleased to

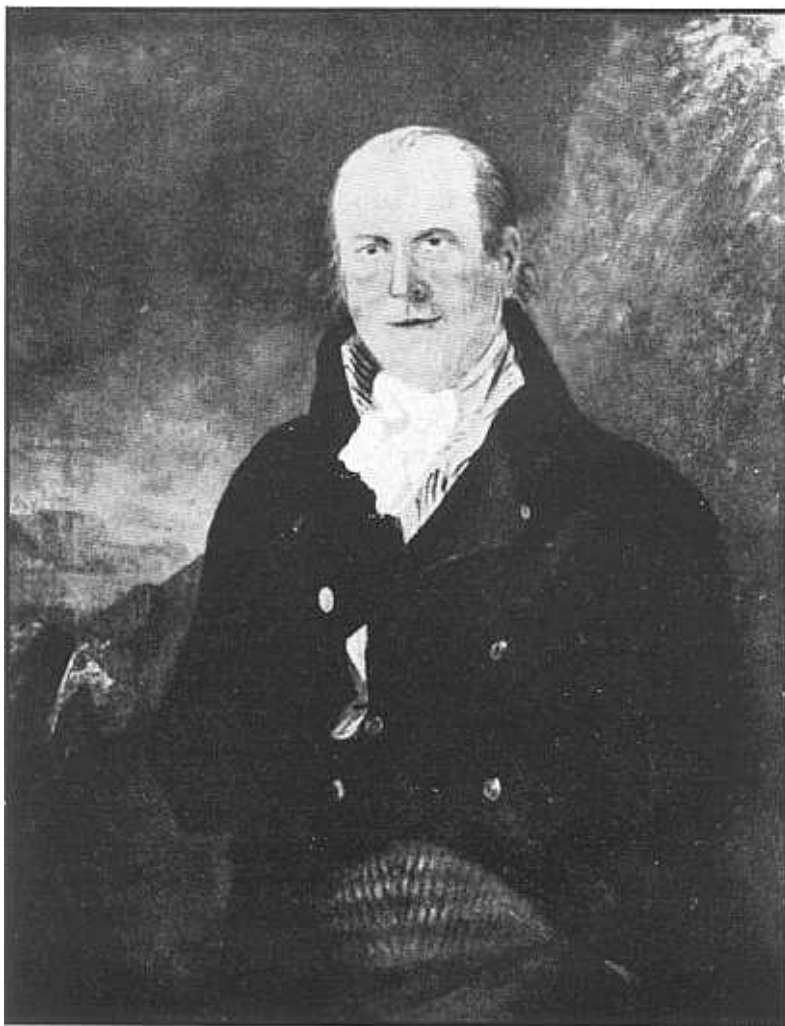


FIG. 46

Francis Masson

Reproduced by kind permission of the Linnean Society of London, from an article by James Britten on Some Early Cape Collectors, in the *Journal of the Linnean Society*, 1920. Mr. Britten comments on the portrait: "Masson is shown with a background of cliff; on the left is a view of Table Bay viewed from the north; Devil's Peak, Table Mountain and Signal Hill are readily distinguishable. The artist is unknown."

adopt the plan, though at that time so little approved by the public, that no one but myself chose to undertake the execution of it." On this first visit, Masson remained at the Cape for two years and a half. He traveled for part of the time with Thunberg, notably on two excursions of about four months each, one beginning in Sept., 1773, the

other at the same season of the following year. To the north they went as far as the Olifant's River and to the East as far as the Zwartkops and Fish River. Masson returned to the Cape for his second visit in 1786. In his absence the Dutch government had become very antagonistic to the exploration of the interior by foreigners. During this second stay, therefore, Masson remained more constantly near Capetown, where he established his famous "little garden," sending home regular invoices of plants and seeds for ten years. Sir Joseph Banks was very insistent that Masson should remain simply a plant collector and gardener, and not attempt to be an explorer. Prof. MacOwan (see page 112) quotes from a curious letter Sir Joseph wrote to Masson at this time: "The plants you have sent home have succeeded so much better than any you sent when you was last at the Cape that we have every reason to praise your industry, and to see the propriety of a search near the place of your residence, in preference to expensive journeys up the country, which seldom produce an adequate return in really ripe seeds. I hope that before this time you have taken up your headquarters, as I directed, at False Bay. The most rare plants to be met with in European herbariums are from that place, and you know that one rare described plant is worth two non-descripts." One cannot help wondering at the change in fashions regarding exotic plants which has come about since this was written. Today it is just these same "nondescripts," or new species, which all botanists are in hopes of finding. Masson's second stay at the Cape lasted ten years, "in which time," he says, "I had opportunities more minutely to search that great tract of country." Finally he was compelled to leave the Cape, "lest I should lose," he explains, "in an expected invasion, the collection of living plants that I had made." On his return to England he resolved to render his time "somewhat profitable to the science of Botany, by publishing observations made on that subject, in the interior deserts of Africa." Thus he refers to the famous little book on his favorite Stapeliads: *Stapeliae Novae* or, *A Collection of several new species of that genus: discovered in the interior parts of Africa*, London, 1796. While dated a year earlier, the book appeared about June, 1797. It contained figures and descriptions of 41 species, four known to Thunberg, one discovered by Col. Gordon, and the remainder all "nondescripts" found by himself. It is not known who executed the figures in Masson's work. A notice in the *Journal of Science and Art*, 1818, states that Masson found among the Dutch troops at the Cape "a soldier possessed of great skill in drawing, and by this man's aid formed a considerable portfolio of coloured drawings of objects which he deemed scarcely capable of transfer to Europe." This soldier is supposed by Prof. MacOwan to have been D. Oldenburg, a Swedish soldier formerly in the employ of the Dutch East India Company, who had been Masson's guide on one of his expeditions in 1772. James Britten, who has written on Early Cape botanists and collectors in the *Journal of the Linnean Society*, 1920, identifies Masson's soldier with Col. R. J. Gordon (see p. 86). All that Masson himself tells us is that "the figures were drawn in their native climate, and though they have little to boast of in point of art, they probably exhibit the natural appearance of the plants they represent better than figures made from subjects growing in exotic houses can do." This modest statement seems to us an indication that Masson himself made some of the drawings. We know he could draw from an account of him in the letter of a friend, James Lee, dated in 1812, which is quoted in Mr. Britten's article. Mr. Lee said: "Masson explored the Cape of Good Hope twice, Madeira, the Canaries, Azores, Spain, Gibraltar, Tangier, Minorca, Majorca, the West Indies and Canada. He was of a mild temper, persevering in his pursuits, even to a great enthusiasm, of great

industry, which his specimens and drawings of fish, animals, insects, plants and views of the countries he passed through evince; and though he passed a solitary life in distant countries from society, his love of natural history never forsook him." Masson made no effort to subdivide the genus *Stapelia*, but he was a botanist of much acuteness and the sequence of his descriptions shows that he sensed many of the distinctions which later men were to put into words. Thus he had 6 *Huernias*, as now understood, and he grouped them together. His 3 *Duvalias* and 3 *Piaranthus* he again grouped together, appropriately one group next the other. Of 18 *Stapelias*, in the restricted modern sense, he placed 15 together, and it was only at the very end of the collection, among what are now *Carallumas*, that there is any deviation from modern usage, his remaining 3 *Stapelias* appearing there out of sequence. The following list of the Masson species retains his specific names, all of which are valid today, except *Caralluma pulla*, which is a synonym for the Linnaean name, *C. mammillaris*, and *Stapelia mixta*, which Dr. Brown considered as a variety of *S. variegata*. We have substituted the modern generic names. The species marked (T) were known to Thunberg and that marked (G) was found by Col. Gordon. The species marked (§) are Masson's "lost plants," which have not been again collected and are known only through his book and herbarium material deriving from specimens gathered by him.

- | | | |
|----------------------------------|---------------------------------------|--------------------------------------|
| 1. <i>Diplocytha ciliata</i> (T) | 15. <i>S. gemmiflora</i> | 29. <i>D. caespitosa</i> |
| 2. <i>Huernia reticulata</i> | 16. <i>S. vetula</i> (§) | 30. <i>Pectinaria articulata</i> (T) |
| 3. <i>H. venusta</i> (§) | 17. <i>S. acuminata</i> | 31. <i>Caralluma pulla</i> (T) |
| 4. <i>H. guttata</i> | 18. <i>S. concinna</i> | 32. <i>C. ramosa</i> |
| 5. <i>H. humilis</i> | 19. <i>S. glanduliflora</i> | 33. <i>C. arida</i> (§) |
| 6. <i>H. campanulata</i> | 20. <i>S. rufa</i> | 34. <i>C. incarnata</i> |
| 7. <i>H. barbata</i> | 21. <i>S. pedunculata</i> | 35. <i>C. parviflora</i> (§) |
| 8. <i>Stapelia verrucosa</i> | 22. <i>S. divaricata</i> | 36. <i>Stapelia pulchella</i> |
| 9. <i>S. irrorata</i> (§) | 23. <i>Trichocaulon piliferum</i> (T) | 37. <i>Caralluma aperta</i> |
| 10. <i>S. revoluta</i> | 24. <i>Piaranthus punctatus</i> | 38. <i>Stapelia mixta</i> |
| 11. <i>S. grandiflora</i> | 25. <i>P. geminatus</i> | 39. <i>S. sororia</i> (§) |
| 12. <i>S. ambigua</i> | 26. <i>P. decorus</i> | 40. <i>Hoodia gordonii</i> (G) |
| 13. <i>S. pulvinata</i> | 27. <i>Duvalia elegans</i> | 41. <i>Caralluma pruinosa</i> |
| 14. <i>S. asterias</i> | 28. <i>D. reclinata</i> | |

In addition to the six species, which have been completely lost since Masson first discovered them, there is no authoritative record that the type forms of *Stapelia asterias*, *S. concinna* and *S. verrucosa* have ever again been collected, although varieties of each are known. A considerable number of Masson's other species were known only from his collections for a century or more, but have been rediscovered in recent years. Among these are the following:

Caralluma pruinosa by G. Alston, c. 1900, (in Little Namaqualand?);
Duvalia caespitosa by H. W. James, 1932, (in Port Elizabeth district?);
Huernia campanulata by G. J. de Wyn, c. 1930, near Prince Albert;
H. guttata by Dr. G. C. Nel, c. 1932, between Willowmore and Port Elizabeth;
Piaranthus decorus by P. Ross-Frames, 1928, near Barrydale, Swellendam district;
P. geminatus by C. A. Smith, prior to 1929, near Klipplaat, Jansenville district;
P. punctatus by J. Archer, 1932, Little Namaqualand;
Stapelia divaricata by Miss K. C. Stanford, 1935, near Heidelberg, C.P.;
S. revoluta by N. S. Pillans, c. 1900, south-east of Clanwilliam.

1777-1779—Exploration of Orange River by Gordon and Paterson.

Rumors of the "Great River" (see *Stapelia gariensis*) had reached the Cape from its first settlement and an expedition under Capt. Hop crossed the river in 1761. But the honor of christening it fell to Col. Robert Jacob Gordon (1741-1795), a Dutch officer of Scotch extraction, who in 1777 reached the river far inland and named it the Orange River after the Dutch Stadtholder, the Prince of Orange. In 1778 Lieut. (later Col.) William Paterson (1755-1810) reached the river in its lower course, and in 1779 Gordon and Paterson together explored the region at its mouth. It was at this time that Col. Gordon discovered *Hoodia gordonii* and Lieut. Paterson discovered *Trichocaulon cactiforme* (?). Fig. 1 is reproduced from Paterson's account of his travels: *Narrative of Four Journeys into the Country of the Hottentots and Caffraria*, London, 1789. Paterson left South Africa in 1781. He traveled in India, 1781-1785, and in Australia, 1791. He died at sea on the return voyage from Australia to England, 1810.

The admiration which Col. Gordon felt for the Prince of Orange had a tragic end. When Holland fell under the revolutionary government of France in 1795, the anti-Orange faction founded the Batavian Republic and the Prince took refuge in England. In 1795 an English fleet arrived at Capetown and demanded the surrender of the colony to England on behalf of their new ally. Col. Gordon, who was now in command of the military forces of the Dutch at Capetown, found himself torn between the loyalty he had always felt to the Prince of Orange and the loyalty he still felt to his country. The English prevailed without a battle, and held the colony for seven years, until the peace of Amiens temporarily restored it to Holland in 1802; and it is said that Col. Gordon committed suicide in chagrin at the English occupation.

1785-1798—Boos and Scholl.

Francis Masson once wrote of his botanical explorations in South Africa: "I succeeded so well that my mission has been the cause of several other botanical expeditions of the same kind being undertaken." One of these was sent by the Emperor, Joseph II, to collect African plants for the Imperial Gardens at Schönbrunn (see p. 91, 1806-1819; de Jacquin). It consisted of 2 men, Frans Boos and Georg Scholl. They set forth in 1785 and within a couple of years had collected nearly 300 cases of living plants; but when a ship came along to take them home it was impossible to get all this material on board. So Boos sailed away with as many boxes as possible, while Scholl stayed behind until about 1798, all the while collecting additional plants. Probably all the new *Stapelias* of Jacquin were discovered by Boos or Scholl, but the only ones actually known to have been collected by their expedition are *Stapelia lepida*, raised from seed sent by Scholl, and *S. fissirostris*, brought back by him.

1787—Curtis's Botanical Magazine.

The founding of Curtis's Botanical Magazine in 1787 was an event of enduring importance, for after 150 years it continues to illustrate the flora of the entire world. William Curtis (1746-1799) was the editor of several botanical works, including the *Flora Londinensis*. On one occasion, speaking of his Magazine and the Flora, he said that "the one brought him pudding and the other praise." He continued as editor of the Magazine until his death. Then Dr. John Sims (1749-1831) edited it until 1826. It was

during the editorships of Curtis and Sims that the STAPELIEAE were best represented in its pages. A variety of *Stapelia variegata* appeared in the first volume, with this note on the care of *Stapelias* in general: "If these plants be kept in a very moderate stove in winter, and in summer placed in an airy glass-case where they may enjoy much free air, but screened from wet and cold, they will thrive and flower very well."

There survives in the early volumes of the Magazine a sense of the wide interest the Stapeliads commanded at the turn of the 19th century. In them we can still meet the nurserymen who were supplying the plants: about 1800 Grimwood and Wykes, and

about 1815 the nursery of Whitley, Brame and Milne; and most important of all, "Mr. Loddiges, nurseryman at Hackney, who has a large collection of *Stapeliae*." Conrad Loddiges (1743-1826) was a Dutch gardener, who had set up his nursery at Hackney in 1771. It was continued by his son, George Loddiges (1784-1846), also editor of the Botanical Cabinet from 1817 to 1834. This periodical contained a number of plates of Stapeliads, mostly drawn by Loddiges himself.

Curtis's Botanical Magazine tells also of the private collections of the period, the garden of Mr. Woodford at Vauxhall, the "copious collection of *Stapeliae*" of J. Walker, Esq., at Stockwell, and many others. It was a large, active group, growing many of the species discovered by Francis Masson. One plant, *Stapelia stricta*, described by Dr. Sims in 1819, should have special mention, as it is otherwise of unknown derivation and has never again been heard of.

In 1826 Sir William J. Hooker became the editor and with the decline in the culture of

succulents fewer Stapeliads were figured. In 1844 there is a note referring to *Stapelia* as "a remarkable genus, respecting which it is to be regretted that many species, formerly known to our gardens, are lost, and scarcely any new ones have been received to take their place." In more recent years many interesting species have again appeared in the Magazine.

William Curtis, the founder, was himself a good artist and it is said that many of the anonymous plates in the first few volumes were drawn by him. Among the artists he employed were James Sowerby and Sydenham Edwards.

A very famous botanical artist, Walter Hood Fitch, was the principal contributor from 1834 (when he was only seventeen year old) to 1877. He drew and lithographed about 2,800 plates for the Magazine. His drawings also appeared in many other periodicals and books, and they are said to have numbered over 10,000 in all. After Fitch severed his connection with the Magazine in 1877, three women became its chief artists. We will refer to the work of Lady Harriet Thiselton-Dyer later. Miss Matilda Smith also deserves mention, for between 1887 and 1904 she had become the sole artist,

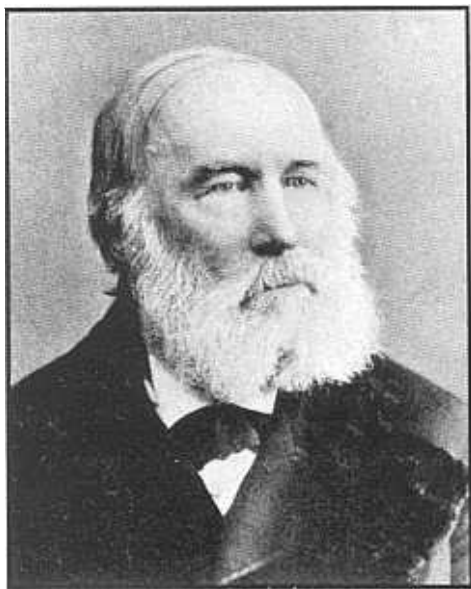


FIG. 47

Walter Hood Fitch

From Dedications Volume, Curtis's Botanical Magazine, 1931.

drawing in all upwards of 1,500 plates. All these artists did important service in making the Stapeliads better known, as will be seen from the plates we have been privileged to reproduce in the pages which follow.

1790—Roxburgh.

Dr. William Roxburgh (1751-1815), a Physician of the East India Company, in the Madras Presidency, was a devotee of botany and spent all his leisure growing pepper and indigo and in making botanical collections, retaining a painter constantly employed in drawing his plants, while he added descriptions and comments. About 1790 Dr. Roxburgh became principal botanist to the East India Company, and between 1791 and 1794 he sent to England 500 of his plates and descriptions. 300 of these were published under the direction of Sir Joseph Banks in a magnificent work, *Plants of the Coast of Coromandel*, London, 3 vols., 1795-1819. Dr. Roxburgh was the discoverer of *Caralluma adscendens*. The so-called Coast of Coromandel had been the scene of the exile of Justus Heurnius in 1632, 160 years earlier, and it seems appropriate that this most important of Indian *Carallumas* should have been discovered in the same region. The colored plates in Roxburgh's work are very large and beautifully finished, and the accompanying text tells of the customs of the natives, the Telingas, or Telugus, in connection with the different plants.

1798—Lady Anne Barnard.

Among early visitors to the Cape, the first one known to have purchased a *Stapelia* plant, out of interest in their curious features, was Lady Anne Barnard, the sprightly and talented wife of the Colonial Secretary of the Cape of Good Hope, 1797-1802. About the middle of April, 1798, the family went for a stay at "Paradise," a little cottage they had outside of Capetown, situated among orange trees and firs on the mountain slopes above Newlands Avenue. Here Lady Anne delighted in the flowers that revealed themselves day after day. Dorothea Fairbridge, who has written a charming account of Lady Anne Barnard at the Cape of Good Hope, Oxford, 1924, quotes from her Diary her description of a *Stapelia*, perhaps *S. hirsuta*, "which she called Madame de Coster, after the woman from whom she bought it; 'a fine large star-like plant, yellow and spotted like the skin of a leopard, over which there grows a crop of glossy brown hair, at once handsome and horrible; it crawls flat on the ground and its leaves are thick and flat.'"

c. 1800—Lady Clive.

The meteoric and tragic story of Robert Clive, founder of the British Empire in India, is universally known through the Essay of Macaulay and the authoritative biography of R. J. Minney, upon which a recent popular film was based. Upon the death of Lord Clive, his eldest son, Edward, succeeded to his title and later became Governor of Madras. In 1784 he married Lady Henrietta Antonia Herbert, daughter of Henry Arthur, Earl of Powis, and upon his return from India in 1804 he was himself created Earl of Powis. While in Madras, the Countess of Powis (Lady Clive) became interested in the little known flora of India and she was the discoverer, in neighboring Mysore, of

Caralluma umbellata, as told by William Roxburgh in a note to his beautiful figure of that species. He says it is "a native of the dry, barren, bushy places, especially under the shade of *Euphorbia antiquorum* over Mysore; from thence," he continues, "the plants were first produced by Lady Clive, who sent several to the Botanic Gardens at Calcutta, where they blossom about the close of the hot season or beginning of the rains in May

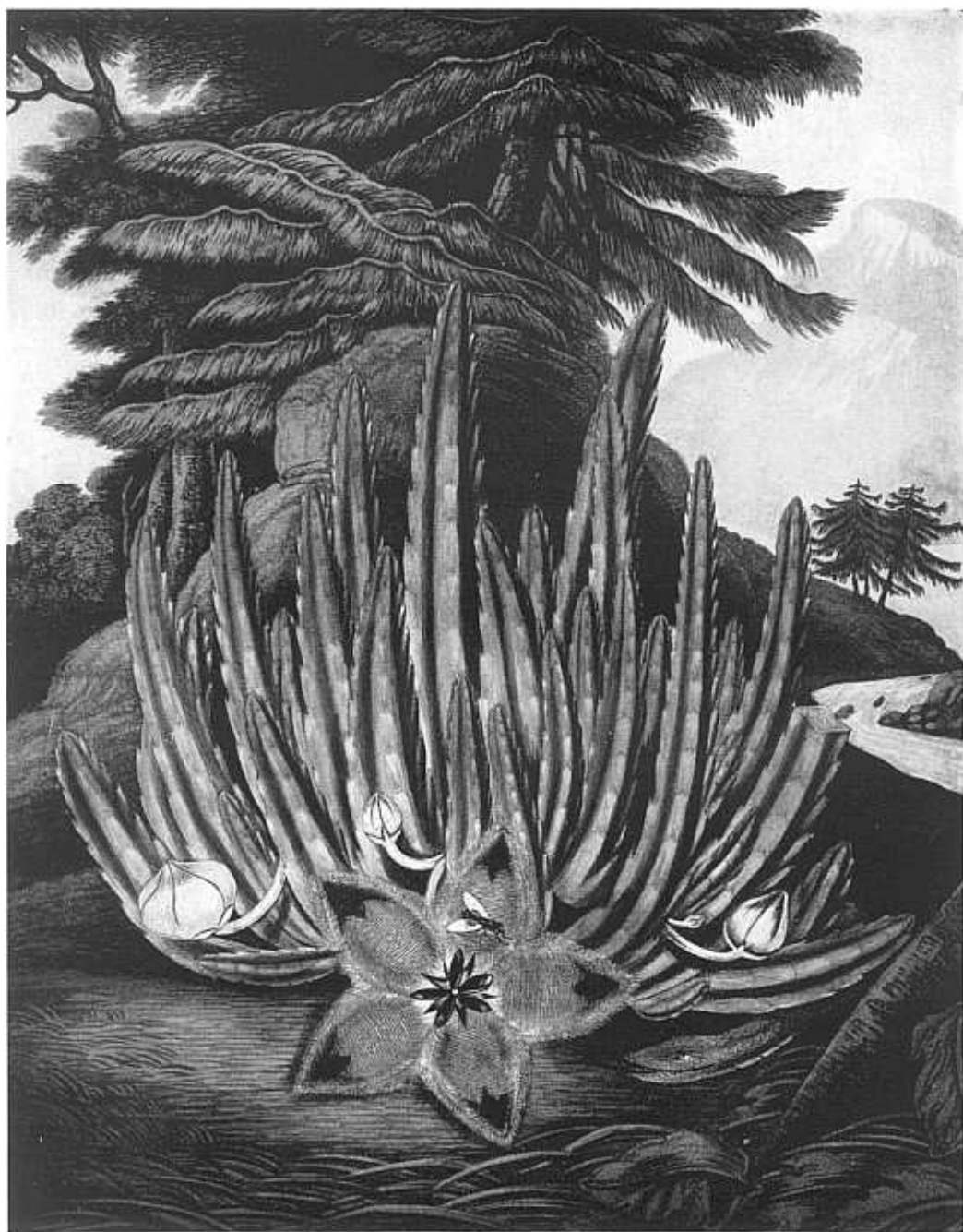


FIG. 48

Henrietta Antonia Herbert, (Lady Clive), Countess of Powis

From the portrait by Sir Joshua Reynolds. Reproduced through the courtesy of the Earl of Powis and the Arundel Society, London.

and June." The date of this interesting discovery was about 1800. In 1793 Roxburgh had become superintendent of the Calcutta Gardens. The Gardens were founded in 1787, as the realization of a dream of Col. Robert Kyd (1746-1793) that a garden be established near Calcutta to cultivate teak and spice trees. Under Roxburgh the scope of the collections was greatly broadened in all branches of the Indian flora by the addition of specimens obtained by him and by others under his inspiration, but *C. umbellata* en-



Stapelia From Aquatint drawn by Henderson and published by
R. Thornton, London,

joys the distinction of having been the only plant presented by the first lady of Madras. We have inquired whether anything is known of the original plant, beyond the brief note by Dr. Roxburgh, but the present Curator of the Herbarium, Mr. Kalipada Biswas, writes us that there is no record at all surviving of the introduction to the Calcutta Gardens of *C. umbellata* prior to 1847.

1801-1812—Thornton.

Dr. Robert John Thornton (1768-1837) was a writer on medical and botanical subjects, remembered for his extraordinary enthusiasm in illustrating what he believed to be the Linnaean system of plant classification. He called his work the *New Illustration of the Sexual System of Linnaeus*. First advertised in 1797, it was published in parts at 25 shillings each from 1799 to 1812. The pages were of Imperial folio size, the illustrations in some editions in black and white, but usually decoratively hand-colored. They form the only large series of early colored flower plates in which the flowers are painted with landscape backgrounds. The original plates wore down quickly and as the impressions became unsatisfactory they were replaced by other subjects; but as the work was nothing more than a fantastic miscellany the plates could be shuffled at will. Thornton enlisted the assistance of two dozen of his contemporaries as painters, engravers and poets, and needless to say succeeded very quickly in ruining himself, so that the rest of his life was spent in futile efforts to rehabilitate himself. In 1811 he secured authority from the British Parliament to conduct a lottery of his botanical works under the patronage of the Prince Regent. Twenty thousand two-guinea tickets were offered for sale. The first prize was the collection of the original drawings for his book, valued at five thousand pounds. There were 9,999 other prizes, valued at seventy thousand pounds. The lottery proved a complete fiasco and, after 1812, no more parts were published. Thornton died 25 years later in extreme poverty. His plate, "the Maggot-bearing *Stapelia*," from a drawing by Henderson, 1801, served as frontispiece to our first edition, and the later "*Stapelia*," also by Henderson, 1812, is the frontispiece of the present volume.

1805—Lichtenstein.

Dr. Martin Heinrich Karl Lichtenstein (1780-1857) was a young physician from Hamburg, who went to South Africa in 1801 and there obtained appointment as surgeon to an infantry battalion of Hottentots. In 1805 he became governmental commissioner to the Bechuanas and in that year, perhaps on his journey to his new position, he is credited with the discovery of *Tavaresia barklyi*, which he collected near the Orange River in the northern Karroid areas of the Cape Province. Dr. Lichtenstein was interested in zoology rather than botany, and upon his return to Berlin, he became professor of zoology in 1811 and later director of the Zoological Museum in that city.

1806-1819—Jacquin.

Baron Nicholas Joseph de Jacquin was the first great collector of *Stapeliads* on the Continent, at the famous Imperial Gardens of Schönbrunn, near Vienna, at the Palace of the last of the Roman Emperors and the first of the Austrian Emperors. His interest in the *Asclepiads* began in 1758, on the occasion of a first visit to America, when his atten-

tion was drawn to the reproductive mechanism of the plants in this family. He wrote an article on the subject in his *Miscellanea Austriaca*, 1778, in the course of which he figured and discussed the two old war-horses, *Stapelia variegata* and *S. hirsuta*. When the plants collected by Masson began to be available to collectors, Jacquin's enthusiasm was boundless. He grew every species he could obtain, studying them when they flowered, as he tells us, for hours and days, with his microscope and a painter at his side to help him record every detail which he saw. Presently new plants and seeds began to come in direct from Boos and Scholl in South Africa, and Jacquin was indefatigable in establishing varieties and harvesting the hybrids from his own gardens.

His principal work on the tribe, with 64 plates, is *Stapeliarum in hortis Vindobon. culturarum descriptiones*, Vienna, 1806, a princely folio, of which copies now cost much more than \$500.00, when they can be bought at all. The date applies only to the first part, for the work was not completed until 1819, when the fifth and final section was published, after Jacquin's death, by his son, Joseph Franz Jacquin, who likewise interested himself in Stapeliads and edited a *Synopsis Stapeliarum* in 1816. The delay in the completion of Jacquin's work was due in some measure to the turmoil of the Napoleonic wars, as we gather from a remark by Dr. Sims in *Curtis's Botanical Magazine*, 1816: "The venerable Jacquin's splendid work on the genus *Stapelia*, though published several years ago, owing to the unsettled state of the Continent, has not till very lately reached this country."

The Imperial Gardens at Schönbrunn have been famous for many features, their menagerie, their forest and the many curiosities of their flower gardens. Here several good species of Stapeliads were first grown, including *Stapelia deflexa*, *S. lepida*, *Huernia clavigera* and *H. ocellata*. Here was first seen Jacquin's important hybrid, *Stapelia mutabilis*; and here, finally, were first identified a number of varietal forms, in the relationships of *Stapelia hirsuta*, *S. variegata*, *S. verrucosa* and other species.

While we can fully appreciate the extent of Jacquin's studies of the Stapeliads, it is no longer possible to affix exact dates to his publications of individual species.

The reason for this is that we do not know the dates of publication of the several parts of his great book, nor even which of the plates appeared in each of the parts. It is probable, but not at all certain, that three of the five parts appeared by 1809 or 1810, a fourth about 1813, and we know the final part was published in 1819. The plates were not numbered, and no copy of the original parts is known. In all cases the plates have been rebound, sometimes in alphabetical order, sometimes with a semblance of botanical order, sometimes with no order at all. The accepted numbering of the plates at the present time is that of the copy in the Library at Kew, which groups the plates according to their present genera. The only guide to the dates of individual plates comes from a study of



FIG. 50
Baron N. J. de Jacquin

the works of other contemporary authors, Haworth and Willdenow in particular, who sometimes cite Jacquin's publications of individual species, thereby establishing a date prior to which the Jacquin plates must have appeared, and who, on the other hand, sometimes fail conspicuously to cite his authorship of other species, which may (though not with any absolute certainty) mean that a given species was figured and described *after* a particular date. The whole matter would be purely scholastic were it not that the correct authorship of several species depends on knowing whether the publication by Jacquin precedes that by Haworth or Willdenow, or not, and this is something which precisely we can probably never know. Thus the right authorship of the species we call *Stapelia deflexa* Jacquin is probably, but not certainly, *S. deflexa* Willdenow; and we shall never be sure whether the correct name of the plant we call *Duvalia compacta* Haworth should not actually be *Duvalia mastodes* (Jacquin).

In the following list we include, under the accepted numeration, the titles of all Jacquin's plates, with the modern modifications and corrections in both generic and specific names inserted in brackets, and with the dates after some species which appear probable from the internal evidence of Haworth and Willdenow; but it must be remembered that these dates are not derived from Jacquin's own work, and may or may not be exact. The names following the species are those of the accepted authors.

1. *Stapelia* (*Huernia*) *campanulata* (Masson) R. Brown;
2. *S.* (*Huernia*) *barbata* (Masson) Haworth;
3. *S.* (*Huernia barbata* var.) *tubata* (Jacquin) N. E. Brown, (1809 or earlier);
4. *S. duodecimfida*: (*Huernia barbata* var. *tubata* (Jacquin) N. E. Brown);
5. *S.* (*Huernia*) *clavigera* (Jacquin) Haworth, (1813 or later);
6. *S.* (*Huernia*) *ocellata* (Jacquin) Schultes, (1813 or later);
7. *S. venusta*: (*Huernia guttata* (Masson) R. Brown);
8. *S.* (*Huernia*) *reticulata* (Masson) Haworth;
9. *S. reticulata* var. *deformis*: (*Huernia reticulata* (Masson) Haworth), (1809 or earlier)
10. *S. hirtella*: (*Duvalia radiata* var. *hirtella* (Jacquin), comb. nov.), (1809 or earlier);
11. *S.* (*Duvalia*) *caespitosa* (Masson) Haworth, (1809 or earlier);
12. *S. radiata*: (*Duvalia elegans* (Masson) Haworth), (1809 or earlier);
13. *S. mastodes*: (*Duvalia compacta* Haworth);
14. *S.* (*Duvalia*) *reclinata* (Masson) Haworth, (1809 or earlier);
15. *S. replicata*: (*Duvalia radiata* (Sims) Haworth), (1809 or earlier);
16. *S. geminata*: (*Piarranthus geminatus* (Masson) N. E. Brown), (1809 or earlier);
17. *S. serrulata*: (*Piarranthus decorus* (Masson) N. E. Brown), (1809 or earlier);
18. *S. verrucosa* (var. *pulchra* (Schultes) N. E. Brown), (1809 or earlier);
19. *S.* (*verrucosa* var.) *roriflua* (Jacquin) N. E. Brown, (1809 or earlier);
20. *S. deflexa* Jacquin, (1813 or later);
21. *S. glanduliflora* Masson;
22. *S. divaricata* Masson, (1809 or earlier);
23. *S.* (*rufa* var.) *fissirostris* (Jacquin), comb. nov., (1813 or later);
24. *S. gemmiflora* Masson;
25. *S.* (*gemmiflora* var.) *hircosa* (Jacquin) N. E. Brown, (1809 or earlier);
26. *S.* (*concinna* var.) *paniculata* (Willdenow) N. E. Brown, (1813 or later);
27. *S. vetula* Masson, (1809 or earlier);
28. *S.* (*vetula* var.) *juvencula* (Jacquin) Berger, (1809 or earlier);
29. *S. mutabilis* Jacquin;
30. *S. mutabilis* var. (*jacquini*) Berger;
31. *S. maculosa* J. Donn, (1809 or earlier);
32. *S.* (*variegata* var.) *conspurcata* (Willdenow) N. E. Brown, (1809 or later);
33. *S.* (*variegata* var.) *trisulca* (J. Donn) N. E. Brown;
34. *S.* (*variegata* var.) *clvbeata* (J. Donn) N. E. Brown;

35. *S. (variegata* var.) *bufonia* (J. Donn) N. E. Brown, (1809 or earlier) ;
36. *S. (variegata* var.) *bufonia* (J. Donn) N. E. Brown, (1809 or earlier) ;
37. *S. anguinea*: (*S. variegata* var. *picta* (J. Donn) N. E. Brown) ;
38. *S. (variegata* var.) *marmorata* (Jacquin) N. E. Brown, (1813 or later) ;
39. *S. variegata* (var. *clypeata*) (J. Donn) N. E. Brown, (1809 or earlier) ;
40. *S. (variegata* var.) *planiflora* (Jacquin) N. E. Brown, (1809 or earlier) ;
41. *S. (variegata* var.) *rugosa* (J. Donn) N. E. Brown, (1809 or earlier) ;
42. *S. normalis*: (*S. variegata* Linnaeus) ;
43. *S. lepida* Jacquin, (1809 or earlier) ;
44. *S. glauca*: (*S. revoluta* Masson), (1809 or earlier) ;
45. *S. revoluta* Masson ;
46. *S. (revoluta* var.) *fuscata* (Jacquin) N. E. Brown ;
47. *S. asterias* Masson, (1809 or earlier) ;
48. *S. stellaris*: (*S. asterias* var. *lucida* (Decaisne) N. E. Brown), (1813 or later) ;
49. *S. (hirsuta* var.) *comata* (Jacquin) N. E. Brown, (1813 or later) ;
50. *S. hamata* Jacquin ;
51. *S. hirsuta* Linnaeus, (1809 or earlier) ;
52. *S. hirsuta* Linnaeus, (1809 or earlier) ;
53. *S. ambigua* Masson, (1809 or earlier) ;
54. *S. ambigua* var. (*fulva*) Sweet ;
55. *S. (hirsuta* var.) *depressa* (Jacquin) N. E. Brown ;
56. *S. sororia*: (*S. hirsuta* var. *patula* (Willdenow) N. E. Brown), (1809 or earlier) ;
57. *S. sororia*: (*S. hirsuta* var. *patula* (Willdenow) N. E. Brown), (1809 or earlier) ;
58. *S. sororia* var. *alia*: (*S. sororia* Masson), (1809 or earlier) ;
59. *S. grandiflora* Masson, (1809 or later) ;
60. *S. pedunculata* Masson ;
61. *S. pedunculata* Masson ;
62. *S. pedunculata* Masson ;
63. *S. pedunculata* Masson ;
- 64-a-b. *S. normalis*: (*S. variegata* Linnaeus) ;
- 64-c. *S. grandiflora* Masson ;
- 64-d. *S. venusta* var. *minor*: (*Huernia guttata* R. Brown) ;
- 64-e. *S. (variegata* var.) *bufonia* (J. Donn) N. E. Brown ;
- 64-f. *S. normalis major*: (*S. variegata* Linnaeus).

1809—Robert Brown.

Robert Brown, 1773-1858, English botanist, first made a division of the genus *Stapelia*, establishing three new additional genera, *Huernia*, *Piarranthus* and *Caralluma*. ("On the Asclepiadeae," an address before the Wernerian Society, 1809, published in the Memoirs of the Society, 1811.) R. Brown is remembered as the first English botanist to advocate the natural system of plant classification. Humboldt called him: "Botanicorum facile princeps."

1812-1819—Haworth.

Adrian Hardy Haworth, English botanist, was a celebrated collector of succulents, whose enthusiasm greatly stimulated a general interest in England and on the Continent. In his *Synopsis plantarum succulentarum*, London, 1812, and *Supplementum*, 1819, he carried forward the subdivision of the Stapeliads begun by R. Brown, establishing the new genera *Duvalia* and *Pectinaria*; *Obesia*, now included in *Piarranthus*; and *Orbea*, *Gonostemon*, *Tromotriche*, *Tridentea*, *Caruncularia* and *Podanthes*, now retained only as the names of subsections of *Stapelia*. Upon Haworth's death in 1833 interest in suc-

culents passed into eclipse. Some old gardeners used to say this was due to the change in the manner of heating glass houses, then known as "stoves," which occurred about this time, from hot air flues to a hot water system, a change which made the successful growth of succulents much more difficult. Another reason may have been that in Haworth's time the potted plants stood in saucers and were watered from below. Presently the use of saucers was given up and the secret of successful culture in the difficult English climate appears to have been lost for the time. As an instance of the methods of culture at the beginning of the 19th century, it may be of interest to quote from Curtis's Botanical Magazine. The Rev. Sackville Bale of Tunbridge Wells had a collection of Stapeliads about 1802. Among other species, he had *Piaranthus geminatus* and *P. punctatus*. "Although these plants for the most part grow in the hot sandy soil of the south of Africa," wrote Sims, "yet they will often flower better when supplied largely with water, provided the heat of the stove be sufficient. Mr. Bale had kept the pans of both the above-mentioned species constantly supplied with water and the stove very hot, to which he attributed their flowering better than they had ever done with him before. *Stapelia geminata* had grown so luxuriantly that the branches hung over the edge of the pot and threw out roots into the water in the pan."

1815-1830—Wallich.

Dr. Nathaniel Wallich (1786-1854), a Dane by birth, went to India in 1807 as surgeon to a Danish settlement there. He was so much interested in the collection and description of plants that, when the settlement fell into the hands of the East India Company in 1813, he was soon appointed in charge of the Botanic Gardens at Calcutta. His activities as a botanist in India continued until 1847, when he returned to London. He had previously been temporarily invalided to London in 1828, at which time he brought with him dried specimens of some 8,000 species of plants. In 1830-32 he published 3 volumes of *Plantae Asiaticae rariores*, or Descriptions and figures of a select number of East Indian Plants, London, illustrated with colored plates which rival those of William Roxburgh in size and beauty. Wallich was the discoverer of *Caralluma crenulata* and *C. adscendens* var. *fimbriata*.

c. 1820—Ehrenberg.

Dr. Christian Gottfried Ehrenberg (1795-1876) was a famous German physician and naturalist. He was for a time an associate of Humboldt, and made a special study of coral and marine organisms and he was the first to demonstrate that phosphorescence at sea was produced by living organisms. In 1820 he went with the scientific expedition of General von Minutoli to Egypt, the Libian desert, Ethiopia and Arabia. It was on this journey, on Dahlac Island in the Red Sea, that Ehrenberg discovered the giant *Caralluma*, *C. retrospectans*.

1824-29—Perrottet.

Perrottet, a gardener-botanist from the Museum of Natural History in Paris, was sent to the French West Coast of Africa (Senegal) from 1824 to 1829 as director of an agricultural experiment station there. He botanized principally along the Senegal

River, between its mouth at St. Louis and Podor, about 100 miles inland. His collections are now in the herbarium of the National Museum in Paris, but the type specimens of two Stapeliads, which he is believed to have discovered (*Caralluma retrospicens* var. *acutangula* and *Caralluma decaisneana*) and which were probably preserved in alcohol, have disappeared. In 1833 with Guillemain and Richard, he began the publication of a Flora of Senegambia, which remained incompleted. Subsequently he became director of the Botanic Garden at Pondichery in French India, where he died about 1850.

1826-1834—Drège.

Johann Franz Drège (1794-1881) was a German botanist, who visited South Africa in 1826-1834 and made extensive collections of plants, totaling, it is said, 200,000 specimens, representing 8,000 species. Much of this wonderful material was destroyed, after Drège's return to Germany, in the great Hamburg fire of 1842. We can therefore never know how many Stapeliads Drège may have collected, his only certain discovery being *Hoodia dregei*, of which a few original scraps from his herbarium survived. It is believed he discovered also *Hoodia bainii* and *Stapelia flavirostris*. Dr. Marloth said that "Drège was the first to establish distinct botanical regions in South Africa, and as Thunberg is the father of South African Botany so is Drège the founder of its Botanical Geography."



FIG. 51

J. F. Drège

From R. Marloth: Flora of South Africa, 1913.

1830—Sweet.

The genus *Hoodia* was established in the 2nd edition of the Hortus Britannicus, or a catalogue of plants cultivated in the gardens of Great Britain, London, 1830, by Robert Sweet (1783-1835). This was the first time any botanist had thought of separating the many-angled species of Stapeliads from those having stems with few angles. The two *Trichocaulons* of Masson and Paterson do not appear to have troubled Sweet, who dismissed one of them as being a *Piaranthus*! But the strange species discovered by Col. Gordon was a real problem. In his 1st edition, 1827, Sweet took it out of *Stapelia*, where it had been for 50 years, and assigned it to Haworth's genus *Gonostemon*. This was eminently an unsatisfactory solution, which Sweet himself recognized and soon corrected by the erection of his new genus *Hoodia*.

1830-1838—Aucher-Eloy.

Pierre Martin Rémi Aucher-Eloy (1793-1838), a French pharmacist, gave up pharmacy to become a publisher, and then in 1830 gave up his publishing business to devote himself wholly to botanical exploration. He made his headquarters in Constantinople, visiting Egypt, Sinai, Palestine, Syria and Cyprus. In 1832 he devoted his attention to Asia Minor. In 1833 he concentrated his studies in the vicinity of Constantin-

ople, going no farther away than to Mount Olympus. In 1834 and 1835 he traveled through Syria and Armenia to the upper Euphrates, and made a second journey through Asia Minor to Bagdad and Teheran. His last expedition took him to Greece, Armenia, the Caspian Sea, Iran and Arabia. In Arabia he contracted a fever, of which he died after his return to Ispahan. A full account of his travels was published by Count Jaubert in 1843. His family name was Aucher, but after the French custom he added the name of his wife, Eloy, at the time of his marriage, and throughout his career as a botanist he was known as Aucher-Eloy. He was the discoverer of *Caralluma aucheriana* and *C. sinaica*.

1832—Gussone.

Giovanni Gussone (1787-1866), the distinguished Italian botanist, made his life-work the collecting of a great herbarium, now in the Royal Botanical Gardens at Naples. It contains 14,000 species of plants from Italy, Spain, France, Switzerland and England. Gussone was a specialist in the botany of Sicily and published *Florae siculae Prodrromus*, Naples, 1827-1834. In this work he tell of his discovery of *Caralluma europaea*, which he collected on the Island of Lampedusa in 1832 and brought to the Botanical Gardens in Naples.

1834-1853—Wight.

Dr. Robert Wight (1796-1872) was a Scotch surgeon who went to India in 1819. He served in the Indian army with intervals until 1836, but all the while botany was claiming more and more of his attention. In 1826-1828 he was placed in charge of the Madras Botanic Gardens. Invalided to England, 1831-1834, he published his *Contributions to the Botany of India*, London, 1834, in collaboration with Dr. G. A. Walker-Arnott. Upon his return to India, his services with the army soon became impossible, for on a march it required several native carts to transport his plants and half a dozen more to convey his books and kit. In 1836 he was given a position in the Revenue Department, and became superintendent of an experimental plant for cotton and tobacco at Coimbatore until 1853, when he returned to England. While at Coimbatore he completed five volumes of *Icones plantarum Indiae orientalis*, Madras, 1838-53, and two volumes of *Illustrations of Indian Botany*, Madras, 1841-50.



FIG. 52

Dr. Robert Wight

From Dedications Volume, Curtis's Botanical Magazine, 1931.

A visitor wrote of Dr. Wight in 1845: "It is only those who know how Dr. Wight is situated who can appreciate the difficulties he has had to contend with in effecting what he has

towards the elucidation of the botany of the southern parts of India. Living upwards of 300 miles from Madras, where the lithography and printing are executed, it is astounding that he has been able to accomplish so much." Dr. Wight maintained at his own expense a plant collector and two native artists, whose names, Gorindoo and Rungiah (also spelled Rungia), are signed to many of his beautiful plates.

We owe to Dr. Wight the discovery of *Caralluma adscendens* var. *attenuata*, *C. diffusa*, *C. indica* and *C. pauciflora*, besides two forms now merged in *C. umbellata*.

c. 1835—Prince von Salm-Dyck.

Joseph Maria Franz Anton Hubert Ignaz von Salm-Reifferscheid-Dyck (1773-1861) was born at Castle Dyck near Düsseldorf, Germany. During the Napoleonic Wars he was deprived of his title of Count, and Castle Dyck became the military headquarters of the French generals in the Rhine Province. The friendship Salm-Dyck formed with the enemy generals proved valuable, directly so, as it led to his being allowed to retain his lands, and indirectly, as it eventually furnished him with an introduction to the great French botanists in Paris. Through the inspiration of Redouté, the painter who illustrated de Candolle's *History of Succulent Plants*, Salm-Dyck began the study and cultivation of succulents and soon his collections became famous throughout Europe. In 1834 Salm-Dyck published his *Hortus Dyckensis*, a catalog of the plants in his gardens; and later he published monographs on his Aloes, Mesembryantheums and Cacti.



FIG. 53

The Prince von Salm-Dyck

From Dedications Volume, Curtis's Botanical Magazine, 1931.

Salm-Dyck was also deeply interested in the Stapeliads, and named several of the minor hybrids of *Stapelia variegata*. Long after his death, Dr. Rüst of Hanover dedicated one of these self-same hybrids, *Stapelia salmiana*, to his memory. Perhaps the chief achievement of Salm-Dyck in furthering the knowledge of Stapeliads lay in

the great amount of material he could offer for the study of visiting botanists to his gardens. Hither came Willdenow, Haworth, Robert Brown, the younger Jacquin, the de Candolles and others, whose accounts of the Stapeliads were in each case based in part on the plants they found at Castle Dyck.

After the fall of Napoleon, Salm-Dyck had a distinguished career in the German Landwehr Regiment, and in 1816 he was created a Prince by King Frederick William III.

1839-1843—Quartin Dillon and Petit.

Richard Quartin Dillon was the discoverer of *Caralluma angu* and *Huernia macrocarpa*. He was the plant collector on a French mission to Ethiopia, headed by Naval Lieut. T. Lefebvre. The expedition landed at Massaua in Eritrea in 1839, and Quartin Dillon made his first shipment of plants from that port in 1840. Glimpses of him are caught from time to time, exploring alone or with the zoological collector of the party, A. Petit, who also is credited with the discovery of a Stapeliad, *Caralluma sprengeri*. Quartin Dillon penetrated through the provinces of Tigré, Shiré and Simen as far as Gondar, capital of the province of Asmara, in the Ethiopian highlands. On his return journey to Eritrea he succumbed to tropic fever and died, Oct. 22, 1841, in the valley of the Mareb, a tributary of the Nile near the boundary between Ethiopia and Eritrea. Petit remained with Lieut. Lefebvre until the return of the expedition to France in 1843.

1839-1847—Munby.

Giles Munby (1813-1876), student of North African plants, traveled in Algeria from 1839 to 1859. In 1847 he published a *Flore de l'Algérie*, Paris. His herbaria of Algerian plants are now at Kew and in the Museum of his native city of York, England. He was the discoverer of *Caralluma munbyana*.

1840-1841—Burke and Zeyher.

Carl Ludwig Philip Zeyher (1799-1868) went out from Germany to South Africa as a plant collector in 1822 and there supported himself meagerly by forwarding to Europe collections of living plants and sets of herbarium sheets. In 1829 he formed a partnership with another collector, C. F. Ecklon, and the systematic work of the two was very extensive, but never very profitable. They lost heavily through fire and shipwreck, and the value of their wares steadily decreased in Europe, where interest in Cape plants was on the wane and the new fashion was all for the tropical orchids. In 1832 Ecklon and Zeyher's best herbarium sets were selling in London at 50 shillings per hundred; in 1846 at 30-40 shillings; and in 1851 at "half-price." These collections of many thousands of specimens appear to have contained no new Stapeliads. But in 1840-1841 Zeyher made a special trip across the Karroo and beyond the Orange River to latitude 24 degrees in the Transvaal, in company with James Burke, a collector of live animals for the Earl of Derby's menagerie. Both Burke and Zeyher kept journals, which are full of strange adventures, but it is pleasant to read of a few quiet moments, during one or two of which they were able to notice the Stapeliads they met on their way. They are credited with the discovery on this trip of four species, *Hoodia burkei*, *Duvalia corderoyi*, *Piarranthus comptus* and *Stapelia engleriana* (see also the story of *Trichocaulon cactiforme*, p. 1032). Burke soon returned to England, but Zeyher lived on at the Cape, save for one or two short journeys home. In spite of many misfortunes, he was always an entertaining sort of man, with a reputation for his matter of fact manner of telling about the many exciting adventures of his younger days. He died of the smallpox in Capetown in 1868.

1840-1899—Mrs. Barber.

Mary Elizabeth Bowker (c. 1819-1899) was brought to South Africa from England as a baby by her father, one of the British settlers of 1820. Her early life was spent on lonely farms, near Port Alfred on the edge of the Karrōo, and later near Queenstown and Grahamstown. It can be imagined what dangers of every kind accompanied farm life on the veld at that period, including attacks by the Kaffirs and frequent sieges, during which women and children were huddled for safety in the laagers. In 1840 Miss Bowker married F. W. Barber, and in 1872 she went with her sons to the diamond fields of Griqualand West, and later to many other parts of South Africa. Endowed with rare powers



FIG. 54

Mrs. Mary Elizabeth Barber

of observation and an ever growing love of nature, Mrs. Barber taught herself botany, entomology, biology, drawing, music and poetry. She became one of the pioneer students of nature in South Africa and was a correspondent of Darwin, the Hookers and many other scientists. Her story has been told in *The Barbers of the Peak*, by I. Mitford-Barberton, Oxford, 1934. Of botany she wrote: "In all places and at all times, in peace and in war, botany has been one of my greatest pleasures; and often, when we have been driven away from our homes, and had them burned by savages, and have had nothing to shelter us but a waggon for months together, then botany has been my sovereign remedy to drive away care. And often my two little boys would say: 'Mamma, shall we ask papa to have the waggon inspanned to go to another place, for there are no more new wild flowers here?'" Mrs. Barber was the discoverer of *Stapelia glabricaulis* and *S. jucunda*. In 1903, after her death, the Kew Bulletin published an article by her on *Stapelia*, from which we have quoted in the Introduction. Her drawings include a number of studies

of *Stapelias*, now preserved in the Herbarium of the Royal Botanic Gardens, Kew, and at the Albany Museum, Grahamstown. Mrs. Barber's brother, Col. James Henry Bowker (1822-1900), discovered *Huernia primulina* and *Stapelia tsomoensis*.

1844—Decaisne.

In the 8th volume of A. Pyrame de Candolle's *Prodromus*, Paris, 1844, the ASCLEPIADACEAE were edited by J. Decaisne, who enumerated 110 species of Stapeliads, of which about 25 were hybrids. Dr. Marloth cites Decaisne to show the increase in the number of species known to botanists in Europe at different dates, contrasting his total with the 2 species known to Linnaeus in 1753, the 7 of Thunberg in 1807, and the 169

in N. E. Brown's *Flora Capensis*, 1909. This comparison implies an increase in known species at the middle of the 19th century, which did not actually occur then. The real increase had come many years earlier, with Francis Masson and Jacquin, and to a lesser degree with Haworth. Decaisne marked no increase, save for a few hybrids. He was typical rather of the Dark Ages in the history of the Stapeliads. It is true that, after Haworth, new species were being discovered little by little in Africa and in India, but in the 50 years from Haworth's *Supplementum* in 1819 to Sir Henry Barkly's arrival at Capetown in 1870 they did not amount to much over twenty in all and in most cases there was a long delay before their formal publication in Europe. The parade of Systems and Dictionaries of Botany, which included Decaisne, 1844, Bentham and Hooker, 1876, and lesser lights, made a brave show of names, which they changed back and forth from one genus to another, but for the most part they suffered from a complete lack of original material and were simply scrambling the eggs which they found in Jacquin's and Haworth's baskets. The forward movement was resumed by Sir Henry Barkly in South Africa and by Dr. N. E. Brown in England. The real progress in the middle years of the century was being made by the Orchids. "In the year 1811," wrote Sir J. D. Hooker in 1868, "the Kew collection of *Stapeliae* contained no less than 44 species; that of epiphytic Orchids, 37. Those were the days of small dry stoves, heated by hot air flues, when the successful cultivation of epiphytic Orchids was regarded as impossible, and our houses overflowed with the representatives of such dry climates as South Africa and Australia. Now we boast of rather fewer species of *Stapelia* (there were only 30 species at Kew in 1872) and about 400 epiphytic orchids; and small as our *Stapelia* collection must appear when compared with the number of species which have been in cultivation, nearly 80, yet it is, I believe, one of the largest now in England."

1853-1861—Welwitsch.

Dr. Friedrich Welwitsch (1806-1872) was an Austrian physician and scientist. He went to Lisbon in 1839, intending to remain a short time, but he became so much engrossed by the flora of Portugal that he stayed for 14 years. He was then commissioned by the Portuguese government to conduct a company of men on a survey of the flora and lower fauna in the Portuguese colony of Angola, 1853-1861. On his return the government granted him a pension to visit England and work out his newly-discovered material at Kew; but he was soon accused in the Portuguese Parliament of "selling the Angola specimens and living in splendor on the proceeds" and his small pension was revoked. He continued to work on his plants until his death, and in 1896-1901 the complete cata-



FIG. 55

Dr. Friedrich Welwitsch

From Dedications Volume, Curtis's Botanical Magazine, 1931.

log of his African Plants was published in London by William Philip Hiern (1839-1925). In a Lisbon periodical of 1854 Welwitsch established the genus *Tavaresia* to provide for one of his new plants, *T. angolensis*. He is credited with the discovery of three other Stapeliads, *Caralluma huillensis*, *Hoodia parviflora* and *Huernia similis*.

c. 1854—Sanderson.

John Sanderson of Durban, Natal, was a keen collector of plants in the middle of the last century and was the discoverer, about 1854, of *Caralluma lutea*. He compiled a series of Rough Notes on the Botany of Natal, published in the Appendix to the second volume of Chapman's Travels in the Interior of South Africa, 1868. In these notes he makes an interesting mention of the discovery of a *Stapelia* some years earlier by R. W. Plant, the species which became famous nine years later when N. E. Brown christened it *S. gigantea*. Speaking of the Asclepiads in general, Mr. Sanderson wrote: "The sub-tribe STAPELIEAE is remarkable for its flowers, which, like the toad or serpent among animals, fix themselves for ever in the memory by their repulsive appearance and their abominable scent. They seem to abound in the upper regions of the colony; and Mr. Plant found a flower of this kind in the Zulu country as large as the top of a hat, and calculated to inspire as much horror by its appearance as the sight of a large serpent might be supposed to occasion. No two of them agree in structure, and there is the greatest possible variety to be found in the form of their flowers. Every one is different from the rest, and all are remarkable."

1858—Plant.

R. W. Plant—nurseryman of Cheadle, England. About 1849, he published a New Gardener's Dictionary. In 1850 he went out to South Africa, and in the London Journal of Botany for 1852 we find an account by him of an Excursion in the Zulu Country.

Mr. Plant is remembered by all lovers of *Stapelias* as the discoverer of *S. gigantea*, the greatest of them all. It is probable that he collected it a short time before his death, which occurred in 1858, for when Thomas Cooper visited the Botanic Gardens at Durban in August, 1862, M. J. McKen drew his attention to this wonderful species, explaining that after Mr. Plant's death in Zululand his Kaffir servants had "brought in" his effects, and among them this mammoth-flowered plant. Mr. Cooper took cuttings back to England with him and distributed them among cultivators there, but it did not receive a name until N. E. Brown christened it in 1877.

S. gigantea was again collected in Zululand by William Tyler Gerrard, a plant-collector who perished at Foul Point on the way to Madagascar in 1866.

Sir J. D. Hooker in 1866 described another species of *Stapelia* under the name of *S. plantii*, and we believe he was dedicating it to the memory of Mr. Plant; but the circumstances are not clear, as the species was sent to Kew by Mr. Tuck from Grahamstown, C.P., and there is no evidence as to its history.

1859-1862—Cooper.

One of the finest private gardens in England between 1855 and 1870 was that of W. Wilson Saunders, F.R.S., at Reigate. Mr. Saunders specialized in exotic plants, and for a number of years maintained a collector, Thomas Cooper (1815-1913), traveling in foreign lands. Mr. Cooper was in South Africa from 1859 to 1862, first making his headquarters around Worcester, then going to Algoa Bay, thence inland to Graaff Reinet, and eventually through the Orange Free State to Natal. He traveled by ox-cart, and the letters he wrote to Mr. Saunders describe vividly the difficulties a plant collector experienced at this period. Besides plants, seeds and bulbs, he collected every kind of natural history specimens, shells and animal horns, insects and reptiles. He was a most "energetic and active man," and sent home one shipment of novelties after another. In the field of *Stapeliads* he was the discoverer of *Stultitia cooperi* and *Stapelia conformis*. After journeying for Mr. Saunders in many lands, Mr. Cooper retired to Kew, living to the ripe age of 98 years. His daughter became the wife of Dr. N. E. Brown.



FIG. 56

Thomas Cooper (May 4, 1859)

c. 1860—McKen.

M. J. McKen was for a few years, early in the second half of the 19th century, Curator of the recently established Botanic Gardens in Durban. The position involved more work than salary, for McKen received only 50 pounds a year and "a small hut;" but even this was an improvement on the remuneration of his predecessor, Dr. Johnstone, who "in lieu of salary and to cover all expenses, *was allowed* to sell the surplus produce of the garden over and above what may be required as stock." McKen filled his position with devotion and won from Sir J. D. Hooker the praise of being the "indefatigable and able Superintendent of the Natal Botanic Gardens." He sent many plants from Natal to Kew, among them, somewhat prior to 1869, the first specimen of *Huernia hystrix* seen in England.

c. 1860—Edgeworth.

Michael Pakenham Edgeworth (1812-1881), Irish naturalist and botanical writer, was a half-brother of the novelist, Maria Edgeworth, who was also a keen student of botany and the author of *Dialogues on Botany*. Michael Edgeworth entered the Bengal civil service in 1831. In 1862 he published a *Florula mallica* in the *Journal of the Linnean Society*, in which he records the discovery of *Caralluma edulis*, which he found being sold for food in the bazaars of north-western India.

1861-1878—Todaro.

Prof. Agostino Todaro (1818-1892), Director of the Palermo Botanic Gardens from 1856 until his death, is remembered alike as a great Italian botanist and as the leading lawyer of his time in Sicily. To exercise two such different professions simultaneously and with eminent distinction in each is a rare phenomenon, which gives a measure of the extraordinary mental activity of the man. Short, stocky, with flashing black eyes and broad forehead, he was as conspicuous a figure in the social life of the day, as in political or scientific circles. A friend to all, serving his country as Senator, traveling extensively, working constantly at the development of his beloved Botanic Gardens and of the smaller private garden on his own estate, collecting a splendid library and herbarium which he presented to the Botanic Gardens at his death, active in a thousand directions, he found time to be a special friend to the *Stapelias*, so generally neglected at that period. He made a particular study of the forms of *S. mutabilis* and *S. variegata*, christening eight new hybrids, of which *S. angulata*, *S. discolor*, *S. trifida* and *S. variegata* var. *atrata* proved the most important. He grew a large number of *Orbeas* at the Botanic Gardens, and the favorable climate of Sicily gave them a rich development. It is pleasant to know that about thirty of these *Orbeas* are still cultivated at Palermo by his successor as Director of the Botanic Gardens, Prof. Dott. Domenico Lanza.



FIG. 57
Senator Agostino Todaro
Photo from Malpighia, 1892.

1864—Dalzell.

In Feb., 1864, N. A. Dalzell, Superintendent of the Botanical Gardens in Bombay, discovered *Frerea indica* while botanizing on a hillfort in the neighborhood of Poona. He dedicated the new genus which he then created to the Governor, Sir Henry Bartle Edward Frere, "not only," he said, "as a mark of esteem and respect, but also because he always has been the enlightened encourager and promoter of scientific researches in India, and is himself a close observer of nature." Bartle Frere (1815-1884) began his career in India as assistant collector at Poona, 1835, was knighted for his services during the mutiny, 1857, was Governor of Bombay, 1862-1867, and in 1877 was appointed Governor of Cape Colony to succeed Sir Henry Barkly, the great *Stapelia* collector. While Frere himself did not share the interest of his predecessor in these plants, yet his career, from Poona to the Cape, curiously symbolizes the march of the STAPELIEAE from *Frerea indica* on the hillfort above Poona to *Stapelia variegata* on Table Mountain above Cape-town!

1864-1911—Bolus.

Harry Bolus (1834-1911) came to South Africa in 1850 from England. He took up the study of botany in 1864, to occupy his mind after the death of his first child. He was living at the time in Graaff Reinet, and while there he took part in one of the Kaffir wars, became an insurance salesman and then a sheep farmer. In 1874 he went to Capetown as a broker, retiring twenty years later. His hobby of botany was the dominant interest of his life. On one occasion, when testifying before a parliamentary commission in Capetown, in answering the question: "You are a botanist?" he said: "I do not call myself a botanist, but I have studied botany in my leisure hours." This modest man was the same of whom Dr. E. P. Phillips has written: "There can be no doubt that Bolus is the outstanding figure in South African botany."

In his Presidential Address before the South African Association for the Advancement of Science, 1930, Dr. Phillips has divided the development of botanical science in South Africa into three periods, and it is interesting to note the relation of Harry Bolus to each of them.

The first period begins with the early collectors, Thunberg, Masson and many others, including the later "lynx-eyed trio," Zeyher, Ecklon and Drège, and it ends with the great taxonomic works of Dr. William Harvey, the *Genera of South African Plants*, (2nd edition, edited by Sir J. D. Hooker, 1868), and the *Flora Capensis*, (first three volumes edited jointly with Dr. O. W. Sonder, 1859-1865). Bolus' own interest in botany began just before the end of this period, and his enthusiasm may be considered as a tribute to the inspiring vitality of the men who figured most prominently in these early developments.



FIG. 58

Harry Bolus

From Dedications Volume, Curtis's Botanical Magazine, 1931.

The second period began in 1890, with the general awakening of activity among resident South African collectors and students. The interval from 1868 to 1890 was one of little accomplishment, during which the cause was carried forward almost solely by Bolus and his associate, Peter MacOwan. Shortly before 1890 they were reinforced by the appointment of J. Medley Wood in Natal and by the arrival of Dr. Marloth and Dr. Schönland at the Cape.

The latter has described conditions as he found them: "There was scarcely a first-class microscope in the country; the South African Museum, the Cape Government Herbarium and the Albany Museum were the only public institutions where natural science, from a sci-

entific point of view, was cultivated. Harvey's *Genera of South African Plants*, the first three volumes of the *Flora Capensis*, de Candolle's *Prodromus* were the most important publications to which one could then turn for direct information in herbarium work. The

teaching of botany had been attempted at the South African College by Prof. MacOwan, but had been given up. In a few schools botany was taught from English text books with the usual terrible results."

It was the great achievement of these five men, Bolus, MacOwan, Medley Wood, Schönland and Marloth, that they aroused South Africa to the understanding, appreciation and study of its extraordinary flora. Their work was united and consistent, and Bolus, the only one of the five to whom botany was never a profession, played the leading part in it, "almost unknown to himself," as Prof. H. H. W. Pearson once said. Bolus was the first to cement the connection of South Africa with the Herbarium at Kew, which he visited in 1876. On the return journey his ship was wrecked in Table Bay and all his botanical materials and notes were lost. But not discouraged, he made a number of later visits to England, always taking his herbarium sheets along for study at Kew. He published a number of books, including three magnificently illustrated volumes on the Cape orchids. He formed the richest herbarium of South African plants in existence and at his death bequeathed it with an endowment to the South African College at Capetown.

The third period of South African botany began, according to Dr. Phillips, in 1903, when a splendid gift from Harry Bolus led to the establishment of a Chair of Botany at the South African College and the appointment of Prof. Pearson to fill it. This inspiration resulted immediately in the more extended teaching of botany in all the Universities and schools, and culminated in the launching of a Botanical Survey by Dr. Pole Evans in 1913 to organize botanical research throughout the Union. In 1925 the new Bolus Herbarium in the National Botanical Gardens at Kirstenbosch was completed and the collections formed by him and his associates were transferred to it.

It is not possible to retrace here more completely the unfolding of the story of South African botany so admirably told by Dr. Phillips. It is a story which everyone interested must read in the original address. In the career of Dr. Harry Bolus one feels that he inherited the aspirations of the early collectors of the first period described by Dr. Phillips; that he was himself the vitalizing force throughout the second period; and that his magnificent gifts were the great inspiration to the complete flowering of the botanical science in South Africa in the third period, which continues to the present day.

As one reads the entire story of South African botany, one experiences many thrills to find how many of the protagonists have been friends of the Stapeliads. Bolus himself was the discoverer of two species, *Huernia brevirostris* and *Piarranthus foetidus*, both collected in the early years when he roamed the mountains around Graaff Reinet, and it would seem that he always retained some interest in the tribe, for he acquired for his splendid library copies of the rare *Stapelia* folios of Masson and Jacquin, copies now in the Library of the South African College.

1865-73—Delpino.

Federico Delpino (1833-1905) was a distinguished Italian botanist, professor at the Universities of Genoa, Bologna and Naples. His principal interests were concerned with the biological study of systematic botany. In 1865-66 he made as extended observations as his limited material permitted on the fertilization of *Stapelias* by different flies. His results appeared in 1867 in a monograph on the Fertilization of the Phanerogams. In 1873, in a general classification of plants according to their floral structure, he placed the Stapeliads in the section he called *Melananti*, or "Black Flowers." Here he defined

two types, Macromyiophilous flowers attracting "large flies" by their dark and livid colors, and Sapromyiophilous flowers attracting carrion flies by their nauseous, cadaverous odors. *Carallumas* he placed provisionally in the first group and *Stapelias* in the second. It would be interesting to investigate how far this distinction can be corroborated by a study of the much greater number of species now in cultivation.

1866-1887—Sir John Kirk.

For 21 years Sir John Kirk (1832-1922) was stationed in Zanzibar, first as surgeon, then as consul-general and political agent for Great Britain. He was born in Scotland, and had gone as physician and naturalist with David Livingstone on the latter's second



FIG. 59

Sir John Kirk

From Dedications Volume, Curtis's Botanical Magazine, 1931.

expedition to Central Africa. In Zanzibar he became virtual ruler of the country, through his influence with the Sultan, Seyyid Bargash. It is interesting to note that Sir Bartle Frere (for whom the genus *Freerea* was named) visited Zanzibar in 1872 to negotiate a treaty for the abolition of the slave trade. He was unsuccessful in this, but upon his departure Sir John Kirk was able to obtain the treaty. He was also constantly active in the negotiations for the division of the Sultan's territory and, in 1887, he was successful in obtaining a lease from the Imperial British East Africa Company of the land which has since become Kenya Colony. Upon completion of this lease, he returned to England. Throughout his stay in Africa his interest as a naturalist continued, and it is commemorated in the names of the numerous plants and animals which have been named after him, including a monkey and a tiny ante-lope. He discovered and brought back to Kew three new Stapeliads, *Caralluma somalica*, *C. speciosa* and *Huernia aspera*.

But the only species which bears his family name, *Huernia kirkii* from the Transvaal, was not named for him, but for his son, Lieut. J. W. C. Kirk, who was its discoverer.

1868-1894—Schweinfurth.

Prof. Georg August Schweinfurth (1836-1925), German ethnologist, botanist and scientist, devoted his entire life to the exploration and study of tropical Africa and Arabia. As a child he dreamed of becoming an explorer and from the age of 13 he be-

gan to train himself physically for the hardships he felt he must face in later years. He learned nearly all the European languages, perfected himself in drawing and developed remarkable erudition in all branches of science. When he was 27, he purchased a small boat and began his first cruise along the shores of the Red Sea, exploring Upper Egypt and Nubia. His first collections were so important that he obtained the support of the



FIG. 60

G. A. Schweinfurth

From *Comptes Rendus de l'Acad. des Sciences Colon.*, 1926.

Humboldt Foundation in Berlin for his later travels, which embraced Southern Arabia, Socotra and almost every section of Africa to the Congo. His many journeys covered half a century and he is specially remembered for his discovery of the Niamniam cannibals and of "Schweinfurth's chimpanzee," a Central African species with marked gorilla-like traits, and for his rediscovery of the Akka pigmies of Equatorial Africa, mentioned by Herodotus.

Wherever Schweinfurth went he collected botanical and other specimens. His cannibal friends called him "Herb-eater," plausibly assuming that he was collecting plants for his food. A large part of his early collections was destroyed by a fire in his camp in the northern Congo in 1870. Almost the only things he saved from the fire were some blank sheets of paper and his ink, but these were a sufficient invitation to him to resume his work, which he did without discouragement. His best known book, *In the Heart of Africa*, was written in German and has been translated into English, French, Italian and Turkish. The complete bibliography of his writings includes 464 titles, covering articles on the most widely varied subjects imaginable.

There is an interesting passage in the *Heart of Africa*, where he tells of his surprise at seeing the women of Jur-land, in the southern Sudan, feeding their hens on the minced stems of a Stapeliad. (The only species of which we have a record from this region is *Huernia macrocarpa*). Schweinfurth was always much attracted by the Stapeliads, and he studied them during more than 25 years and cultivated them in his garden in Eritrea, 1891-1894. It should be noted that the only species bearing his name, *Caralluma schweinfurthii*, was not discovered by him, but by Dr. Stuhlmann. The plants he discovered were *Caralluma adenensis*, *C. commutata*, *C. longidens*, *C. penicillata*, *Echidnopsis nubica*, *Edithcolea sordida* and *Huernia concinna*.

1870-1877—Sir Henry Barkly.

Sir Henry Barkly (1815-1898) was a distinguished member of the governing body in the British Empire in the third quarter of the 19th century, having represented Queen

Victoria in many lands. He was Governor in turn of the Island of Mauritius in the Indian Ocean, of British Guiana in South America and of Victoria in Australia. From 1870 to 1877 he was Governor General at the Cape, and this proved a most auspicious period for the Stapeliads. Sir Henry became much interested in this lowly tribe of his subjects, and throughout his stay he did everything in his power to collect them and to cultivate them in the gardens of Government House in Capetown. As the plants flowered, drawings were made by his wife, Lady Barkly, and his daughter, Miss E. B. Barkly, and copies of the drawings, together with living specimens and plants preserved in alcohol, were sent to Kew.

These invoices began a gradual renaissance of interest in the Stapeliads in England, which had been dormant since the death of Haworth. The specimens were placed in the hands of the young N. E. Brown, who in 1890 published a general account of them, with 25 illustrations, in Hooker's *Icones Plantarum*. Dr. Brown's account had special importance, because it set forth his reasons for holding out against the dismemberment of the genera *Caralluma* and *Stapelia* (see Appendix E).

Among the species discussed in Dr. Brown's *Stapeliae Barklyanae* were *Caralluma armata*, *C. dependens*, *C. hottentorum*, *C. intermedia*, *Duvalia angustiloba*, *Hoodia barklyi*, *Huernia primulina*, *Piar-*



FIG. 61

Sir Henry Barkly

From Dedications Volume, Curtis's Botanical Magazine, 1931.

anthus cornutus, *P. grivanus*, *Stapelia arnoti*, *S. barklyi*, *S. fuscopurpurea*, *S. namaquensis*, *S. olivacea*, *S. tsomoensis* and *S. virescens*. These plants were not all discovered personally by Sir Henry, but he never missed an opportunity to ask others to help him better his collection. Besides the important contributions he received

from Mrs. F. W. Barber, Col. J. H. Bowker and Thomas C. Bain of the species discovered by them, *Duvalia angustiloba* and *Stapelia virescens* were brought to him by Mr. Dickson, *Hoodia barklyi* by Mr. Lycett, and *Caralluma intermedia* by Mr. Reynolds

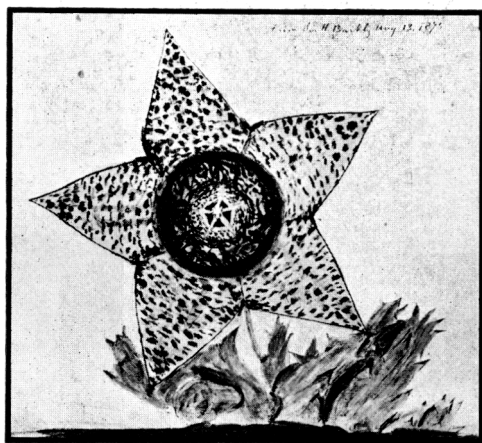


FIG. 62

Stapelia namaquensis N. E. Brown

From an original drawing by Miss E. B. Barkly in the Herbarium of the Royal Botanic Gardens, Kew, of a plant brought to Sir Henry Barkly from Little Namaqualand by Rev. Mr. Morris in 1873.

of Namaqualand. Prof. Peter MacOwan, who also collected for Sir Henry, used to smile at "the zealous endeavors of Civil Commissioners and District Surgeons, anxious to humor what they deemed a whim of his Excellency."

The circumstances connected with Sir Henry's acquisition of two species are of particular interest. Diamonds had been discovered in the northern central part of the Cape Province in the years following 1867, the famous DeBeers and Kimberley mines in the early months of 1871. The region of Griqualand West, as it is now called, lay just west of the Orange Free State, and the chief of the Griqua tribe, Nicholas Waterboer, who claimed the land, was hard pressed from within by the claims of a local government set up by the miners and from without by the rival claims of the Free State. David Arnot, who was the agent of Waterboer, came to Sir Henry and won his support to a formal annexation of his chief's lands, and on November 4, 1871, a party of Cape Mounted Police arrived at the diggings and raised the British flag. The event is commemorated in the name of Barkly West, the oldest town in Griqualand West, situated at the centre of the Vaal River diamond diggings; but it is commemorated also in a humbler way by our knowledge of two Stapeliads, *Stapelia arnoti* and *Piarranthus grivanus*, which David Arnot brought to Sir Henry Barkly for his collection from the well-satisfied province of Griqualand West.

1870-1877—Bain.

Andrew Geddes Bain (1797-1864) was a Scotch engineer who went out to the Cape in 1820. In the field of engineering, he was made famous by his successful construction of the difficult mountain road over Bain's Kloof Pass, near Wellington, and in the field of science he became equally famous as "the father of geology in South Africa." His son, Thomas C. Bain, interested himself in botany and was an able assistant to Sir Henry Barkly in the study of Stapeliads. He was a keen collector, and discovered *Caralluma linearis*, *Stapelia erectiflora*, *S. parvipuncta* and *Trichocaulon flavum*. *Hoodia bainii*, collected by Mr. Bain and named for him, was probably discovered by J. F. Drège. We regret being unable to present a likeness of Mr. Bain, but through the courtesy of Miss Gunn we have the privilege of including the portrait of his distinguished father. The name of Thomas C. Bain must not be confused with that of Thomas Baines, the discoverer of *Duvalia polita*.

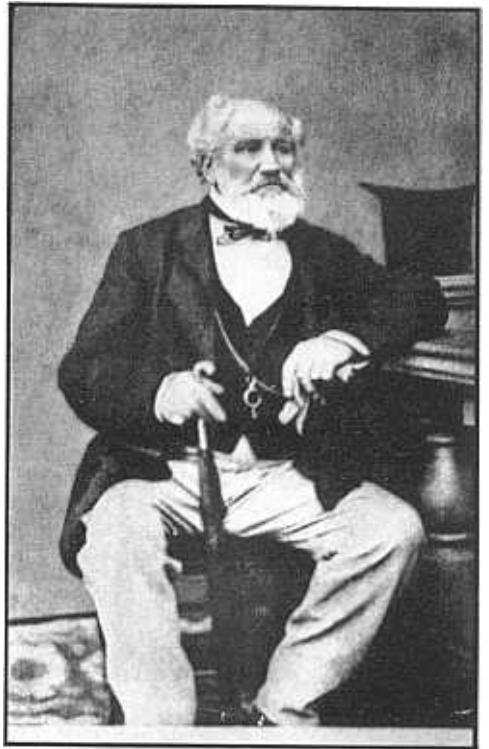


FIG. 63
Andrew Geddes Bain

1871—Sir Joseph Hooker.

Sir Joseph Dalton Hooker (1817-1910) in the *Botanical Magazine* for 1871 established the new genus *Echidnopsis*, to provide for *E. cereiformis*, a species whose first discoverer is unknown. "Hook. fil.," as he is referred to in botanical citations, was the son of Sir William Jackson Hooker (1785-1865), director of the Royal Botanical Gardens at Kew from 1841 to 1865 and the founder of Hooker's *Icones Plantarum*, the periodical in which many years later N. E. Brown was to publish his account of the Stapeliads collected by Sir Henry Barkly. Sir Joseph Hooker succeeded his father as director of Kew Gardens from 1865 to 1885. He was the author of many botanical works, including *The Flora of British India*, London, 7 vols., 1875-1898, which includes an excellent summary of the knowledge of the Indian *Carallumas* to that date.

1871—Baines.

Thomas Baines (1822-1875), intrepid English traveler and one-time companion of David Livingstone, did much to render the outside world conscious of East Africa in general and Southern Rhodesia in particular. He started his career as a house painter in England, went to the Cape in 1842, was an artist in the Kaffir War, 1848-51, and went on Livingstone's Zambesi expedition in 1858. His paintings of the Zambesi River, notably of the Victoria Falls, became famous. His writings told the world of the rediscovery of gold and of the vast riches awaiting development throughout the fertile regions from the Zambesi on the north to the Limpopo on the south. Today his name survives in that of *Aloe bainesii*, one of the largest of all Aloes. The discovery of *Hoodia bainii* has been attributed to him, the confusion between his name and that of Thomas Bain being a natural one. The only Stapeliad collected by Thomas Baines appears to have been *Duvalia polita*.

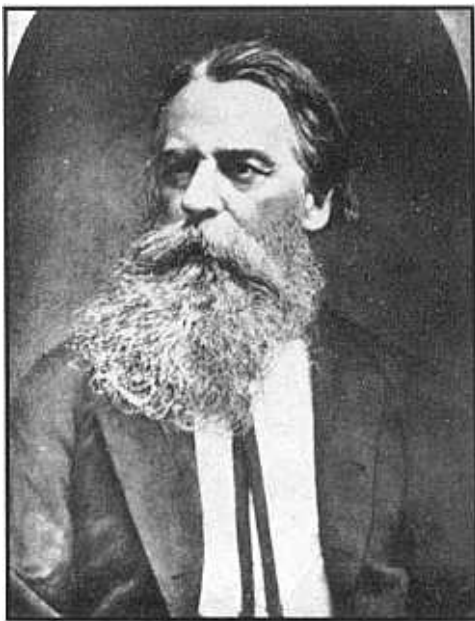


FIG. 64

Thomas Baines

From The Gold Regions of South Africa.

1872-1887—Holub.

Dr. Emil Holub (1847-1902), a Bohemian surgeon, came to the Kimberley diamond fields in 1872, and devoted his earnings and his leisure to a series of explorations in the northern Transvaal and through the Bechuanaland Protectorate to the Victoria Falls in Rhodesia. In 1886 he and his wife endeavored to traverse the entire continent from Capetown to Cairo. They reached the Zambesi River west of the Victoria Falls and explored Northern Rhodesia until the party was attacked by natives, when they were forced

to give up the expedition. Dr. Holub made extensive collections of plants and animals, in the Transvaal and Rhodesia, which were distributed among a hundred or more museums and schools in Europe. He was the discoverer of *Caralluma valida*.

1872-1881—Hildebrandt.

Johann Maria Hildebrandt (1847-1881) was a young German machinist. The loss of an eye in an explosion when he was little more than 20 years old unfitted him for his work, and in some way he turned to botany. He was a born naturalist and devoted to his new work. In 1872 he undertook what Sir J. D. Hooker once referred to as "a courageous series of explorations," visiting in turn Arabia, Somaliland, East Tropical Africa and Madagascar. His health was very poor and he died at the age of 34, worn out from his exertions. In spite of all handicaps, Hildebrandt discovered many important plants, including two Stapeliads, *Caralluma gracilipes* and *Echidnopsis virchowii*.

c. 1875—MacOwan.

Prof. Peter MacOwan (1830-1909) came to South Africa from England in 1861. He was an educator and for a time Principal of Shaw College, Grahamstown. In 1869 he became professor of Science at Gill College, Somerset East. His interest in the botany of South Africa was already very marked in Sir Henry Barkly's time, and it soon grew to be the dominant element in his life. In 1881 he was appointed curator of the Botanic Gardens at Capetown, and in 1891 Government Botanist. He was also curator of the Government Herbarium. His own herbarium is included in that of the Albany Museum in Grahamstown. He was the discoverer of *Stapelia macowani*, *S. desmetiana* and *Huerniopsis decipiens*.



FIG. 65

Peter MacOwan

From R. Marloth: *Flora of South Africa*, 1913.

Prof. MacOwan was a man of wide human sympathies, working without thought of reward, advancing the cause of botany in South Africa by his inspiration of others as well as by his own studies. In 1886 he was President of the South African Philosophical Society, and in his presidential address he gave an admirable account of the careers of many of the earliest botanical collectors, an account from which we have frequently quoted. "It is one thing to be a botanist," he said. "It is quite another thing to be a botanical collector, traveling in search of plants through outlandish countries, often in peril of life, always poor and certain to receive little recognition. Yet the number of these laborers who bear the burden and heat of the day, and bring the erudite describer his materials, is by no

means small. Nor will they cease from the face of the earth so long as the love of wild nature and a certain strain of gipsyhood combine to make men unable to endure the monotony of labor which brings no ideas."

1877-1909—Thiselton-Dyer.

Sir William Turner Thiselton-Dyer (1843-1928) edited the volumes of the *Flora of Tropical Africa*, 1904, and the *Flora Capensis*, 1909, which contained the revisions of the STAPELIEAE by Dr. N. E. Brown. Sir William was himself interested in Stapeliads, and his occasional articles on succulents included one on *Hoodias*, then a little known genus, published in the *Journal of the Linnean Society* in 1877. As Director of the Royal Botanic Gardens at Kew, 1885-1905, he effected many improvements, including the reconstruction of the Succulent House so that it might house adequately the *Stapelias* and other succulents, which were arriving from South Africa in larger numbers than had been the case at any time since the death of Haworth. It has been said of Sir William that, among his many botanical achievements, the most important was to make Kew the botanical centre of the British Empire.

In 1877 Sir William married Miss Harriet Ann Hooker, eldest daughter of Sir Joseph Dalton Hooker. As daughter of one Director of Kew, and wife of his successor, Lady



FIG. 66

Sir William Turner Thiselton-Dyer

From Dedications Volume, Curtis's Botanical Magazine, 1931.



FIG. 67

Harriet, Lady Thiselton-Dyer

From Dedications Volume, Curtis's Botanical Magazine, 1931.

Thiselton-Dyer was for many years as prominent a figure in English botanical circles as she was a charming one. She was an amateur artist of skill and one of her drawings, the *Hoodia bainii* in Fig. 68, is a landmark in the history of Curtis's Botanical Magazine. In 1878, during her father's editorship of the Magazine, the artist, Walter Hood Fitch, after some disagreement with Sir Joseph, withdrew his services without notice. This was a severe blow to the Magazine, for Sir Joseph considered Fitch to be "an incomparable artist." Delay in the publication of succeeding issues, possibly suspension of the

Magazine, would have followed Fitch's withdrawal, but for the ready help of Lady Thiselton-Dyer. She saved the situation by immediately beginning the contribution of a series of delightful plates, numbering in all nearly ninety. The first of all was the plate of *Hoodia barnii*, which thus besides its botanical interest recalls pleasantly Lady Thiselton-Dyer's debut in the Magazine at a critical moment.

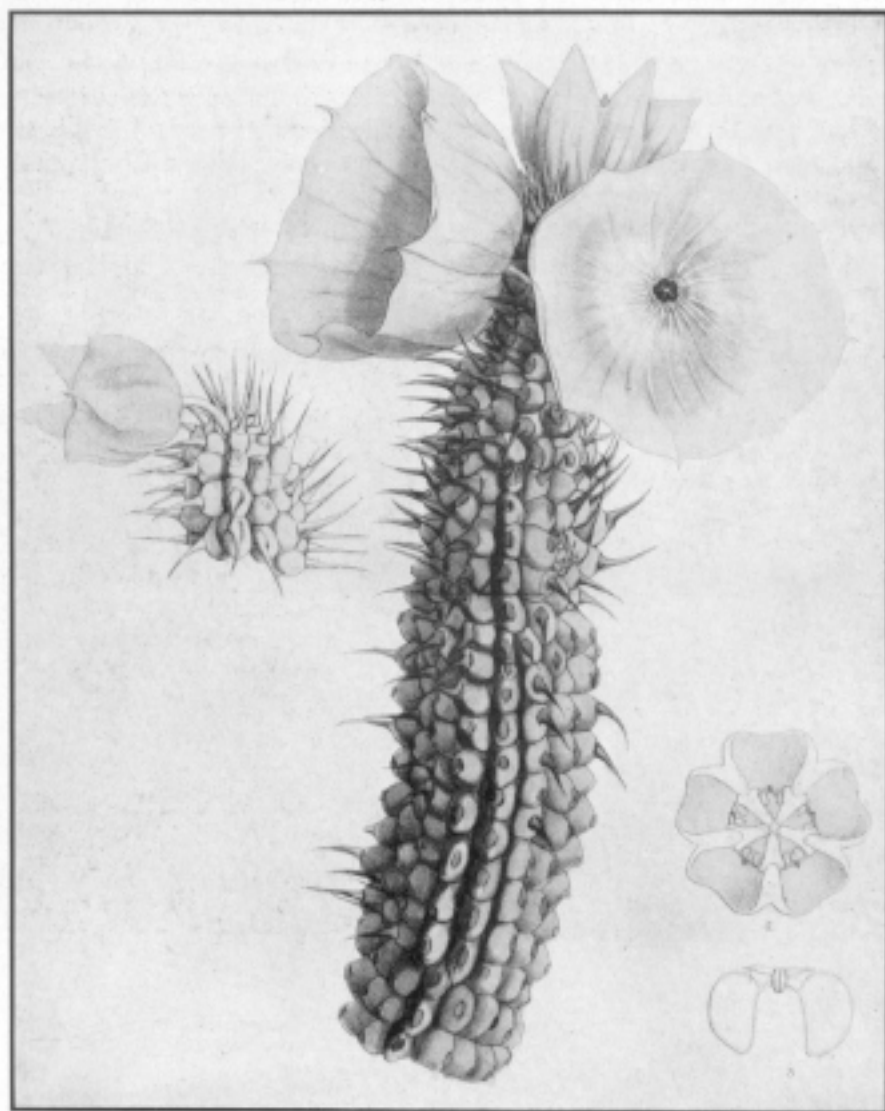


FIG. 68

Hoodia barnii Dyer

From a drawing by Lady Harriet Thiselton-Dyer in Curtis's Botanical Magazine, 1878.



FIG. 69

Dr. N. E. Brown

From the *Journal of the Cactus and Succulent Society of America*, Vol. VI, No. 9, 1935

1878-1934—N. E. Brown.

The revision of the STAPELIEAE of Tropical and South Africa by Dr. Nicholas Edward Brown (1849-1934), in the *Flora of Tropical Africa*, Vol. 4, Sect. 1, London, 1904, and in the *Flora Capensis*, Vol. 4, Sect. 1, London, 1909, is the starting point for the modern study of the tribe. Both Floras are indispensable to any serious student. They

were edited by Sir William T. Thiselton-Dyer and are published by L. Reeve and Co., Lloyds Bank Building, Bank Street, Ashford, Kent, England. The *Flora of Tropical Africa* contains descriptions of 50 Stapeliads, of which 10 were new, and the *Flora Capensis* contains descriptions of 210 species, and 45 of these were new.

The total work done by Dr. Brown on behalf of the Stapeliads cannot be estimated. When he took up his studies, the enthusiasm aroused during the life-time of Haworth had almost wholly subsided and interest in succulent plants was at a low ebb in England and in Europe generally. Yet it was from part of Haworth's own collection that Dr. Brown first derived the inspiration towards a botanical career. This was in 1867, when a schoolboy not yet 18, his teacher, knowing of his fondness for plants, took him to see the collection of W. W. Saunders in Reigate. "When Haworth died," Dr. Brown wrote, "his collection was sold and at a later date sold again, and in the collection I was then looking at were many of the plants that had once formed part of Haworth's type-collection."

On Feb. 3, 1873, he joined the staff of the Royal Botanic Gardens at Kew, and became First Assistant in the Herbarium. The STAPELIEAE were his first love and remained a life-long hobby. Very shortly a more general interest in succulents began to return, at first under the stimulus of the collections sent to Kew by Sir Henry Barkly, and in this reawakening of interest Dr. Brown played a constant part from the first day when the plants of Sir Henry were placed in his hands to study. He was interested in every branch of botany, from the microscopic dissection of individual plants to the taxonomy of entire families. He worked incessantly. Of some of his original drawings of Stapeliads, reproduced in this book through the courtesy of the Bentham Trustees, he wrote us: "They were made while eating my midday sandwiches and could not be fully completed, but I think show all that is necessary for scientific purposes." There was no interruption in his work for over sixty years. A few weeks before his death he wrote: "I am working on three monographs, and one is nearly finished."

His first important contribution to the classification of Stapeliads came in 1878, when he erected three new genera, *Diplocyatha*, *Huerniopsis* and *Trichocaulon*, in the *Journal of the Linnean Society*. In 1895 he created a fourth new genus, *Edithcolea*, in the *Kew Bulletin*. His work on the species, in addition to the revision in the two Floras already mentioned, included an account of Sir Henry Barkly's plants, *Stapeliae Barklyanae*, in Hooker's *Icones Plantarum*, 1890, and a complete enumeration of the *Carallumas* then known, with their synonyms, in the *Gardeners' Chronicle*, 1892. Many descriptions of single species also appeared in the *Kew Bulletin* and other periodicals. But his writings were by no means all on the technical side, as witness a charming article "About Succulent Plants," in the *Cactus Journal of the Cactus and Succulent Society of Great Britain*, 1932, from which an extract is quoted in Appendix C. Of Dr. Brown's writings on the Asclepiads in general and on many other families of plants, we cannot speak here, aside from a reference to the very beautiful book on *Mesembryanthema*, London, 1931, in which he collaborated with Dr. A. Tischer and Miss M. C. Karsten. He had the honorary degree of Doctor of Science conferred on him in 1932 by the University of Witwatersrand, South Africa.

But above all his actual scientific achievements, survives the memory of his simple affectionate character. He was never too busy to help others. When we began the study of *Stapelias*, we wrote him with some hesitation. He answered at length, and when we commented on his ability to take time to help strangers, he wrote: "You mention that my

letters give you pleasure. I am exceedingly glad to know that, for it recalls the days when like yourself I was very enthusiastic over *Stapelias* and the letters and information from Sir Henry Barkly, and later from Mr. N. S. Pillans and others, always gave me intense pleasure, and I have in turn tried to requite it in some measure."

1880—Capt. Ein.

Thure Gustave Ein (or Een) was a Danish sea captain, who made a trading voyage along the coast of Hereroland, South West Africa, in 1880. He had a botanical turn of mind and along his way he "procured many very strange plants," which he brought back to Kew. Among these was *Huernia oculata*.

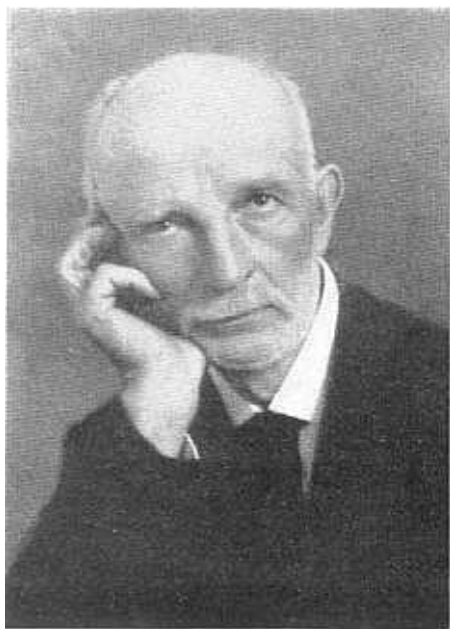


FIG. 70
Dr. Rudolf Marloth



FIG. 71
Isaac Bayley Balfour
From Dedications Volume, Curtis's Botanical
Magazine, 1931.

1880—Balfour.

Isaac Bayley Balfour (1853-1922), a Scotch botanist, was Professor of Botany at Oxford and later at Edinburgh. He was a recognized authority on the botany of southern China. In the winter of 1880, he made an expedition to Socotra, and there discovered *Caralluma socotrana*, a species again collected a few months later, May, 1881, by Schweinfurth. Prof. Balfour published a Botany of Socotra, Edinburgh, 1888.

1883-1931—Marloth.

Dr. Rudolf Marloth (1855-1931), a German analytical chemist, came to South Africa in 1883. As so many others have done, he fell at once under the spell of the South African flora, and he was destined to be the interpreter of this spell to the world at large by his thorough scientific training, his absorbing interest in the living functions of plants, his great artistic skill in photography, his happy literary style and his essentially friendly nature, which made him want to share with others every pleasure his hobby brought him. Marloth discovered many plants and many secrets of the plant world. He collected a very fine herbarium and wrote many books and papers. His greatest monument is the *Flora of South Africa*, a magnificent work in four volumes (bound in six), published through the generosity of Sir Lionel and Lady Phillips. Begun in 1913, completion of the work was delayed by the World War and a fire which destroyed many of the early plates. The final volume appeared in 1932, after Dr. Marloth's death. In his wide embrace of the South African flora, he included a warm interest in the Stapeliads and himself discovered a dozen new species, five of them *Trichocaulons*: *Caralluma marlothii*, *Stapelia marlothii*, *Trichocaulon marlothii*, *Caralluma longipes*, *C. simulans*, *Stapelia cincta*, *S. flavo-purpurea*, *S. surrecta*, *Trichocaulon meloforme*, *T. pictum*, *T. rusticum* and *T. simile*.

1885-1886—Schinz.

Dr. Hans Schinz, who was long Director of the Botanical Gardens in Zurich, Switzerland, made a journey to South West Africa in 1885-1886. He collected many species of plants, but a large number of them remained undescribed until the early visits of Prof. Kurt Dinter to South West Africa led to renewed interest in the flora of that country and turned the attention of Alwin Berger and Dr. R. Schlechter to the Schinz herbarium. The Stapeliads discovered by Dr. Schinz embrace *Stapelia schinzii*, *Caralluma nebrownii*, *C. vaga*, *Stapelia kwebensis* var. *longipedicellata* and *Tavaresia grandiflora*.

1885-1886—Stapff.

F. M. Stapff, a geologist commissioned by the German South West Africa Colonial Company to prospect for copper in the Kuisib Valley of South West Africa in 1885-86, was the discoverer of *Trichocaulon pedicellatum*.

c. 1885—Mrs. Monteiro.

Mrs. Monteiro was an English lady, who married a Portuguese entomologist and naturalist, Joachim J. Monteiro, author of a standard work on Angola and the River Congo. After her husband's death, in 1877, Mrs. Monteiro lived in Portuguese East Africa. She wrote a very interesting book, *Delagoa Bay, its Natural History and its Inhabitants*. While her special hobby was the collection of insects, she also studied the native plants and was the discoverer of *Stapelia longidens*.

c. 1885—Hart.

Henry Chichester Hart (1847-1908), an Irish botanist, was the naturalist on the British Polar Expedition of 1886. His main field of study, however, beginning in 1883, was in Palestine and Sinai, and in 1891 he published a standard work on the Fauna and Flora of Sinai. He was the discoverer, about 1885, of *Caralluma aaronis*.

1889-1894—Deflers.

Albert Deflers of Cairo, Egypt, was a student of the flora of southern Arabia, about which he wrote numerous monographs, notably his *Voyage botanique au Yemen*, Paris, 1889, and *Les Asclépiadées de l'Arabie tropicale*, Cairo, 1896. During expeditions in the winter of 1889-90 and the spring seasons of the years 1890, 1893 and 1894, he followed the Arabian coastline from Aden through the district of Bilad Fodhli and penetrated the interior at several points. Deflers looked on his travels as an opportunity for personal liberty and clearness of thought. He felt himself a disciple of the Goddess Freya, goddess alike of the Earth and of Liberty. Most of his travels were free of adventure, for he enjoyed the friendship of the Arab chiefs and the armed shepherds of the mountains welcomed him and shared with him the milk of their herds. But on one occasion he did not fare so well. He had gone due north from Aden as far as Sana, which he was the first European to reach. An Austrian explorer, who had preceded him, had been assassinated by the Arabs, and Deflers, though traveling in native dress and speaking the language fluently, nearly suffered a similar fate. He overheard by chance a conversation between two men of his caravan, discussing a plot against his life. With a few faithful men he left the caravan the same night and made his escape back to the coast, which he only reached after a series of dramatic adventures. Deflers was a most retiring gentleman, as well as a botanist and scholar of great learning. He died at the age of 73. In his explorations he discovered four new Stapeliads, *Caralluma anemoniflora*, *C. awdeliana*, *C. chrysostephana* and *Echidnopsis scutellata*.

1889—Schönland.

Dr. Selmar Schönland came to South Africa in 1889 to act as Curator of the Albany Museum at Grahamstown. His activities have been very varied. He has written on many subjects and built up the collections in his Museum from about 1,000 specimens to over a hundred times that number. He retired in 1926 and still lives in Grahamstown, honored as the Dean of South African botany. Of the men most closely associated with the middle period in the history of South African botany (Bolus, MacOwan, Medley Wood, Marloth and himself) he is the only one who has not personally discovered one or more of the Stapeliads. Yet he has been greatly interested in them. For many years he had a large collection of living species in his garden in Grahamstown and he has been instrumental in leading many others to their study. In 1905 he read an address before the British and South African Associations for the Advancement of Science on "Our Knowledge of Succulents," in which he told the story of the gradual increase in knowl-

edge of the different groups of succulents, including the Stapeliads, and drew special attention to the prevailing ignorance about many of these plants. "Much of this," Dr. Schönland writes us very modestly, "has since been remedied."

1890-1910—Engler.

Geheimrath Dr. Adolph Engler was for many years director of the Botanic Garden and Museum at Dahlem, near Berlin, Germany. He was the principal director of *Die Natürlichen Pflanzenfamilien*, Leipzig, 1889 ff, a monumental systematic account of all known genera of plants and their more important species. The STAPELIEAE were reviewed for this work by K. Schumann, in Vol. IV, 1895, who there established several new sub-sections of the genera *Caralluma* and *Huernia*. Prof. Engler also long edited the periodical *Botanische Jahrbücher*, Leipzig, in which the formal descriptions of a number of Stapeliads have appeared. Prof. Engler made several botanical journeys to Africa, having discovered *Caralluma priogonium* in German East Africa (Tanganyika) about 1890 and *Trichocaulon engleri* in South West Africa, while traveling with Prof. Kurt Dinter about 1910. In 1905 Dr. R. Schlechter dedicated to Prof. Engler *Stapelia engleriana*, which had been first collected by Burke about 1840 and which 65 years later was re-discovered growing quietly in the Dahlem Gardens. Dr. Schlechter thought it might have been introduced there by Dr. Stuhlmann from Tropical East Africa, but as its regular habitat is in the Karroo this explanation is probably an error.

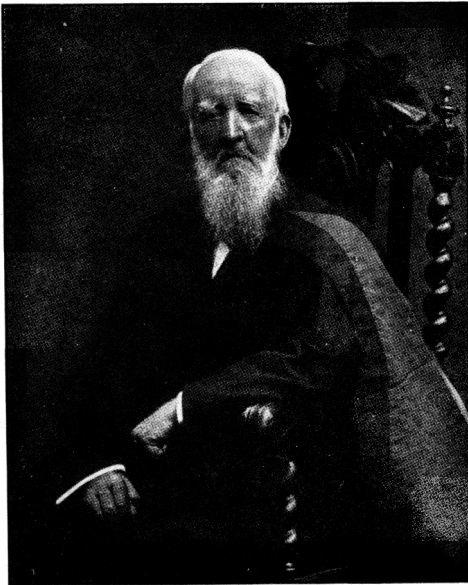


FIG. 72

John Medley Wood

from Dedications Volume, Curtis's Botanical Magazine, 1931.

c. 1890—Medley Wood.

John Medley Wood (1827-1915) was a young English naval officer who retired from the East Indian merchant service in 1852 and settled in Natal, where he became much interested in botany. He was appointed curator of the Botanic Gardens at Durban in 1882, and director of the Natal Herbarium. The Durban Gardens are more tropical in character than any in the Cape Province, and Medley Wood accomplished much towards their development, notably in the establishment of the Jubilee Palm House in 1898. He was not only very active in collecting the native plants, but he also introduced many economic foreign plants into Natal, including the sugar cane. He discovered *Stapelia woodii* about 1890. His principal work was *Natal Plants*, in six volumes, 1898-1912.

1891—Stuhlmann.

Dr. Franz Stuhlmann, deputy-governor in 1891 of German East Africa, accompanied Emin Pasha on his ill-fated last expedition into Central Africa. In May, 1891, they crossed into the Congo State by the south shore of Albert Edward Nyanza and spent the balance of the year exploring unknown country on the borders of the great Congo Forest. In December, 1891, Emin Pasha sent Dr. Stuhlmann back to the East Coast, himself remaining behind with a very reduced party. Emin Pasha was murdered in October, 1892, by an Arab slave raider. Dr. Stuhlmann was an authority on the tse-tse fly and other African subjects. His principal work was *Mit Emin Pasha ins Herz von Afrika*, Berlin, 1894. *Caralluma schweinfurthii* was collected by Dr. Stuhlmann near Nswiwa, Itande, in the Congo State while he was with Emin Pasha.

1891—Penzig.

Prof. Otto Albert Julius Penzig (1856-1929), born in Prussian Silesia, began his botanical career at Karlsruhe in 1877. Ill-health forced him to seek the warmer climate of the Mediterranean and in 1887 he was appointed Professor of Botany at the University of Genoa, a chair he occupied till his death.



FIG. 73
Prof. O. Penzig

In 1891, with the financial aid of Sir Thomas Hanbury, he founded the Hanbury Botanical Institute, whose splendid equipment provided opportunity for a wide enlargement of his botanical researches. Penzig was a man of astonishing activity, with the sharpest eyes, a rapid grasp of technical detail and a passion alike for scientific knowledge and philosophic speculation. A great naturalist and scholar, his 40 years in Genoa meant much to the cause of botany throughout Italy. He published over a hundred books and articles, written with equal fluency in Italian, Latin, German, French and English. He loved travel. One of his most interesting studies, 1897, deals with the return of vegetation to the island of Cracatoa, on which all plant life had been wiped out by the volcanic eruption of 1883. On an earlier expedition, 1891, he accompanied Georg Schweinfurth to Eritrea. The plants he collected there are preserved in the Hanbury Institute and include his *Stapeliads*, *Huernia macrocarpa* var. *penzigii* and *Echidnopsis dammanniana*.

1891-1894—Schlechter.

R. Schlechter (afterwards Dr. Schlechter) came to South Africa in 1891 as a professional collector. He explored a territory greater perhaps than that covered by any other botanical collector, through the Cape Province, Natal and the Transvaal. He became especially interested in all branches of Asclepiads, and later published numerous papers concerning them. His herbarium is preserved in the collection of the Botanical Gardens at Zurich. Dr. Schlechter was the discoverer of *Caralluma chlorantha*, *C. melanantha*, *Huernia confusa*, *H. loeseneriana* and *H. stapelioides*, and he named four of the species himself. He also performed good service for the STAPELIEAE in helping to describe some of the South West African species of Prof. Hans Schinz and Prof. Kurt Dinter.

1892—Ruspoli and Riva.

Prince Eugenio Ruspoli, Italian scientist and explorer, is best known for his survey of the River Juba, which rises in the Ethiopian highlands and flows across the Galla and Somali countries to the Indian Ocean. He made two expeditions to Ethiopia and Somaliland, on the second of which, in Dec., 1892, while traveling with a devoted young companion, Dr. Domenico Riva, he discovered the curious Stapeliad, *Caralluma rivae*. Prince Ruspoli was killed in the Galla country in December, 1893, by the charge of an elephant. Dr. Riva was a botanist, who had shortly before won his spurs as a plant collector in a previous African expedition with Prof. Schweinfurth, early in 1892. The death of Prince Ruspoli was a shock from which he was unable to recover mentally. He returned to Italy in April, 1894, deposited with the Botanical Institute in Rome the valuable collections which the Prince and he had made in Africa, and ended his life by his own hand.



FIG. 74

Dr. Domenico Riva

Enlarged from a group photograph of the botanists present at the International Botanical Congress in Genoa, 1892.

1892—Terracciano and Pappi.

Prof. Achille Terracciano, 1862-1917, was Professor of Botany at the University of Sassari, in Sardinia, from 1906 until his death. He made a botanical expedition to Eritrea in 1892-93 with Agostino Pappi, in the course of which they discovered *Caralluma dicapuae*. Pappi (born c. 1870) is the gardener-collector for the Italian Colonial Herbarium and is now (since 1901) resident at Asmara in Eritrea.

1893-1897—Bent.

James Theodore Bent, 1852-1897, an English traveler, made his last visit to Hadramaut, the region in Southern Arabia east of Aden, in 1896-1897. He was seized with malarial fever during this journey and died in London, May 5, 1897, a few days after his return. Just before his death he sent to Kew Gardens the fragments of plants collected on this last journey, including four new species of Stapeliads. In earlier years he explored the Persian Gulf, spent a year in Rhodesia, where he made a somewhat romantic study of the Great Zimbabwe ruins of Mashonoland, 1891, and began his explorations in Southern Arabia in 1893. His Stapeliads are *Echidnopsis bentii*, *Caralluma flava*, *C. torta* and *Duvalia sulcata*.

1893—Lunt.

William Lunt (1871-1904) was a gardener at Kew who was assigned in 1893 to go to Hadramaut in Southern Arabia with James Theodore Bent. He there collected the *Caralluma* which bears his name, *C. luntii*. The following year, 1894, he was appointed Assistant Superintendent of the Botanical Garden at Trinidad, and later curator of the Botanical Station at St. Kitts, and he remained in the West Indies until his death.

c. 1894—Mrs. Lort-Phillips and Miss Cole.

Somaliland was one of the last regions in Africa to be opened to Europeans. An expedition in 1854 provoked an uprising of the Somali warriors, and for more than 20 years no further attempts to visit the interior were made. In 1883 a party of four Englishmen penetrated from Berbera on the north coast in British Somaliland to the River of the Leopards, the Webi-Shebeli, in the Ethiopian highlands, and returned without misadventure. One of these four was the distinguished English explorer, E. Lort-Phillips. His wife interested herself in botany and cultivated a number of Stapeliads in her garden in Berbera.

About 1894 Mrs. Lort-Phillips and Miss Edith Cole were members of an expedition from Berbera to the Golis Mountains. They collected about 350 species of plants, of which about one in seven proved to be new to science. Miss Cole is credited with the discovery of *Caralluma edithae* and *Edithcolea grandis*, and Mrs. Lort-Phillips with that of *Echidnopsis somalensis* and *Huernia somalica*, which she sent to the Botanic Garden in Cambridge, England, about 1896.

1896-1898—Major and Mrs. E. J. Lugard.

In 1896 Major (later General) Frederick John Dealtry Lugard (English soldier, explorer and administrator, who in 1928 was created first Baron Lugard for his distinguished services to the British Crown in many lands) led an expedition for the British West Charterland Company across the Kalahari Desert in Bechuanaland to Lake Ngami. His brother, Captain (now Major) E. J. Lugard, D. S. O., accompanied him, and interested himself in making a collection of plants, of which a full account appeared in the Kew Bulletin in 1909. It included 374 species, of which 92 were new. The specimens

THE STAPELIEAE

were collected by Major E. J. Lugard and Lord Lugard, in 1896, and by Major and Mrs. Lugard in 1897-1898. Included among the new species were six Stapeliads, *Caralluma lugardi*, *Hoodia lugardi*, *Huerniopsis atrosanguinea*, *C. lateritia*, *C. maculata* and *Stapelia*



FIG. 75
Major E. J. Lugard



FIG. 76
Mrs. E. J. Lugard

kwebensis. Major Lugard writes us an amusing anecdote of one additional species which he discovered, but which must perforce remain legendary: "There was another, far handsomer species of *Stapelia*, which I found in the Kalahari Desert, but, true to its



FIG. 77

Major E. J. Lugard and native porters, photographed near a tree-groundsel (*Senecio gardneri*) while on a plant collecting trip on Mt. Elgon, Kenya, at 13,000 feet elevation. Photo by de Las Casas.

character as 'the carrion plant of South Africa,' its odor was so offensive that either the *Stapelia* or I had to abandon the wagon,—and it was the *Stapelia* that left." Mrs. Lugard was a professional miniature-painter and for many years exhibited her work in the Royal Academy. On this expedition she made water-color drawings of a number of the species, which were later purchased by the Bentham Trustees and are now in the Royal Botanic Gardens at Kew. The very beautiful drawing of *Stapelia kwebensis* facing page 463 formed a part of this Flora of Ngamiland.



FIG. 78

Prof. Kurt Dinter in South West Africa, preparing herbarium sheets for drying and pressing on the corrugated iron roof of a dwelling.

Photo by E. B. W. Schoenfelder.

1897-1935—Dinter.

Prof. Kurt Dinter's visits to South West Africa, over a period of nearly forty years, provided the first comprehensive botanical survey of the country and yielded a great harvest of new discoveries. During his several journeys he covered more than 25,000 miles, on foot, by ox-cart and by motor truck, and his collections aggregated upwards of 8,000 plants. His accounts of these botanical explorations fill a number of books and pamphlets, and cover an extremely varied field. Especially important to collectors of the Stapeliads are the *Neue Pflanzen Deutsch-Südwest-Afrikas*, Okahandja, 1914, with beautiful photographs, and *Succulentenforschung in Südwestafrika*, Part 1, Dahlem, 1923, and Part 2, Herrnhut, 1928. Prof. Dinter and his wife and faithful helper, Frau Jutta Dinter,

have been the discoverers of a wonderful series of Stapeliads, including *Stapelia dinteri*, *Trichocaulon dinteri*, *Hoodia juttae*, *Stapelia juttae*, *Caralluma rangeana*, *C. wilfriedi*, *C. winkleri*, *Hoodia macrantha*, *H. similis*, *Stapelia ausana*, *S. albocastanea*, *S. bergeriana*, *S. pachyrrhiza*, *S. portae-aurinae*, *S. ruschiana*, *Trichocaulon delaetianum*, *T. halenbergense*, *T. karasmontanum*, *T. keetmanshoopense*, *T. perlatum*, *T. pubiflorum*, *T. sinus-lüderitzii*.



FIG. 79

Frau Jutta Dinter

Photo by Robert Kubitz.

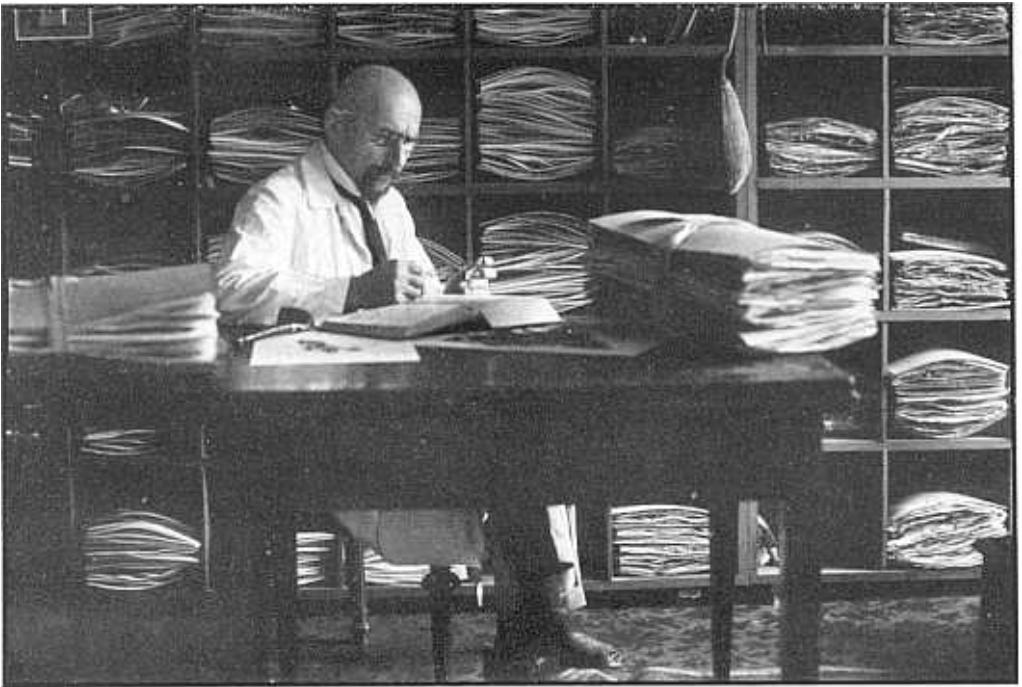


FIG. 80

Prof. Kurt Dinter

Photo by Robert Kubitz.

1898—Paulay.

Stefan Paulay (1839-1913) was an Austrian marine surgeon, endowed with a passion for collecting plants at every port he chanced to visit. Between the years 1887 and 1901 we hear of him from Brazil to Madagascar, now in the Comoros, now at Cape Verde or the Cape of Good Hope. The important collections he made are preserved at the Hofmuseum in Vienna. In 1898-1899 he accompanied an expedition sent by the Imperial Academy of Sciences in Vienna to Socotra, Arabia and the Gulf of Aden under the leadership of Prof. D. H. Müller, and it was on this expedition that he discovered *Caralluma rosengrenii*.

1899—Chevalier.

Auguste Jean-Baptiste Chevalier, born at Domfront, France, June 23, 1873, is Professor at the National Museum of Natural History in Paris and director of the *Revue de Botanique Appliquée*. He has made many botanical explorations into tropical central and western Africa, since 1898, across the Sahara, to Lake Chad and to the confines of the basins of the Nile and Cheri. On June 29, 1899, he rediscovered in the French Sudan *Caralluma decaisneana*, first collected in Senegal 70 years earlier. On July 22 of the same year he first collected, near Timbuctu, the var. *tombuctuensis* of *Caralluma retrospiciens*. It was brought to his attention by Père Yacouba-Dupuis, the "White Monk of Timbuctu," a deeply pious, violent and eccentric French ex-missionary, whose adventures have made him a most picturesque, almost a legendary, figure in French West Africa and whose biography has recently been written by the American author, William Seabrook. Prof. Chevalier may also have been the first collector, in 1910, of *Caralluma dalzielii*. In 1934 he published in his *Revue de Botanique Appliquée* an article on the Stapeliads observed by him in the course of his travels. Chevalier is a disciple of Georg Schweinfurth and has written reminiscences of the latter's life. One story he tells illustrates admirably the point of view of the native towards the foreign scientific explorer. "One day," he says, "while guest of Sultan Senoussi, I spoke of Schweinfurth. Suddenly Senoussi recalled that as a child he had seen Schweinfurth at Ziber Pasha's in Bahr-el-Ghazal and he made this comment: 'You are just like him! You do not come into our country as a conqueror, nor as a merchant, nor as a Believer going to Mecca; you come to see new things and put them down on paper. And just for that you risk your life. I have had you watched. I

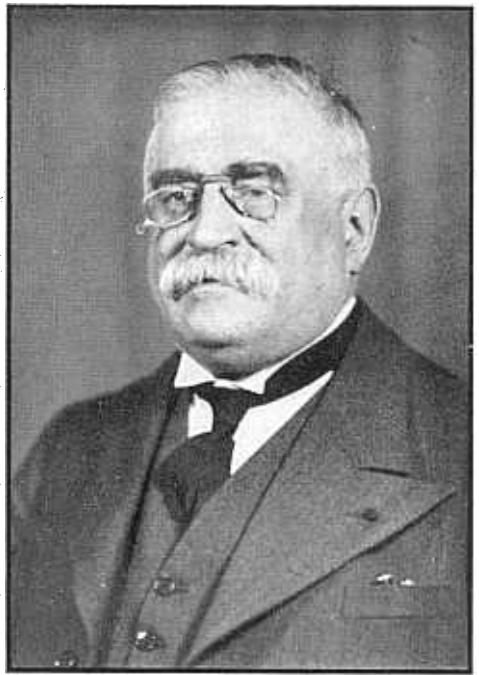


FIG. 81

Prof. Auguste Chevalier

cannot understand at all what you are doing, but I will let you proceed and will help you, for I feel sure you are like the White Man who came to Ziber Pasha and hurt no one.' And the Sultan, who had caused the massacre of other expeditions, kept his word."

c. 1900—Miss Pegler.

Miss Alice Pegler (1861-1929) was a botanist of Kentani, in the Transkei, whose activities were restricted to the study of the Flora of her own section of the Cape Province; yet they were conducted with so much skill and thoroughness that her work, principally embodied in a monograph on the Flora of Kentani, has received wide notice. She formed a local herbarium of some 2,000 specimens, and contributed her duplicates generously to all the great South African herbariums as well as to Kew. She was the discoverer of *Stapelia peglerae*.

c. 1900—Gossweiler.

The only interested collector of Stapeliads in the Portuguese colony of Angola since the time of Welwitsch is John Gossweiler of Luanda, recognized authority on the botany of Angola and the Portuguese Congo. Mr. Gossweiler is a Swiss by birth, sent to Angola in 1900 by the Portuguese Government to open a Botanical Experiment Station. His activities are still very varied, for he writes: "One day I act as an adviser on cotton growing, the next as a mycologist, and then I am called upon to cope with a plague of locusts. I do a good deal of traveling and all my spare time I devote to collecting plants." Mr. Gossweiler is the discoverer of *Caralluma gossweileri* and *Huernia volkartii*.

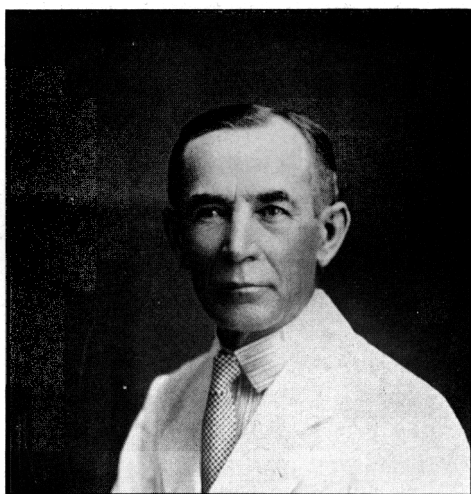


FIG. 82
John Gossweiler

c. 1900—Pillans.

Charles Eustace Pillans, I.S.O. 1907, was born at Rosebank, C.P., in 1850. As a young man he served as Acting Adjutant with Carrington's Frontier Light Horse, winning War medals in the Galeka Kaffir War, 1877-78, and the Basuto War, 1880-81. He held many public offices, including among others those of Surveyor of Provincial Post Offices, Agricultural Assistant, Director of Information Bureau, Director of the Government Labor Bureau and Stamping Commissioner. Through all these activities he found his favorite recreation in gardening and in collecting Cape succulents. At his home in Rosebank he grew many of the rarer Cape plants, including his own discoveries among the Stapeliads, *Stapelia jucunda*, *S. miscella*, *S. desmetiana* var. *pallida* and *Huernia*

clavigera var. *maritima*. In 1905 the botanical achievements of Mr. Pillans received government recognition through his appointment as Horticultural Assistant of the Cape Colony. He died in 1919.

Mr. Pillans' only son, Neville S. Pillans, of the Bolus Herbarium, Kirstenbosch, is the most eminent collector of Stapeliads in the eventful history of the tribe. He has not only discovered a very large number of new species and varie-

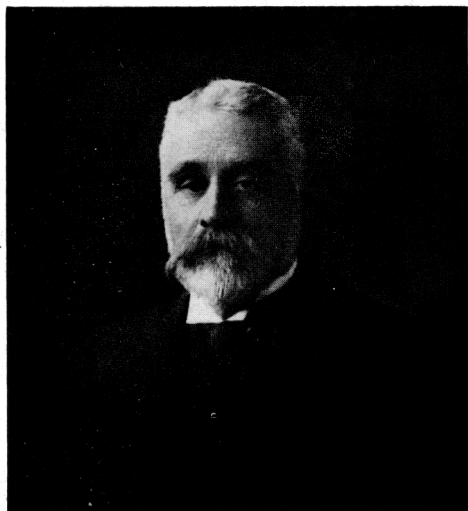


FIG. 83
Charles Eustace Pillans

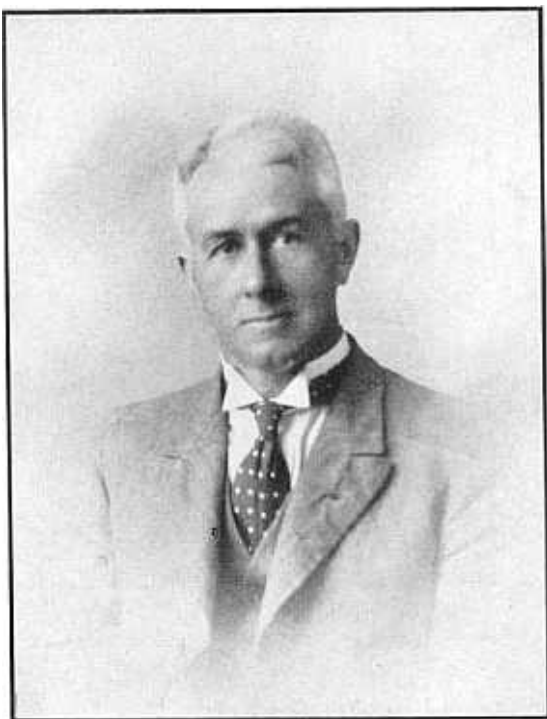


FIG. 84
N. S. Pillans

ties, many extremely rare and several found only in a single plant, but he has rediscovered a number of the hitherto lost plants of Francis Masson and other early collectors. The major part of his collecting was done in the early years of the century, and it proved a most important factor in making possible the thorough revision of the South African Stapeliads by Dr. N. E. Brown in the *Flora Capensis*. More recently other botanical interests, including in particular the *Restionaceae*, have claimed Mr. Pillans. "There are many collectors of *Stapelias* now-a-days," he says, "and I feel I have done my bit." Yet as recently as 1926, in the course of a visit to Little-Namaqualand, he discovered four new species, one of which was so distinctive as to require the erection by him of a new genus, *Stapeliopsis*. Mr. Pillans' discoveries, not to mention many new varietal forms of other species, include: *Caralluma pillansii*, *Duvalia pillansii*, *Hoodia pillansii*, *Huernia pillansii*, *Pectinaria pillansii*, *Piarranthus pillansii*, *Stapelia pillansii*, *Trichocaulon pillansii*, *Caralluma arenicola*, *C. longicuspis*, *Duvalia maculata*, *D. modesta*, *D. parviflora*, *Huernia distincta*, *H. longituba*, *H. namaquensis*, *H. praestans*, *Pectinaria arcuata*, *P. asperiflora*, *P. saxatilis*, *Piarranthus disparilis*, *P. parvulus*, *Stapelia fucosa*, *S. gariepensis*, *S. umbonata*, *Trichocaulon cinereum*, and *T. grande*. Where not otherwise stated in the

text, these several species were discovered by Mr. Pillans in the years preceding the publication of the *Flora Capensis*, 1909.

Stapeliopsis neronis was discovered by Nero, a Hottentot in the employ of Mr. Pillans on his expedition of 1926 to Little Namaqualand.

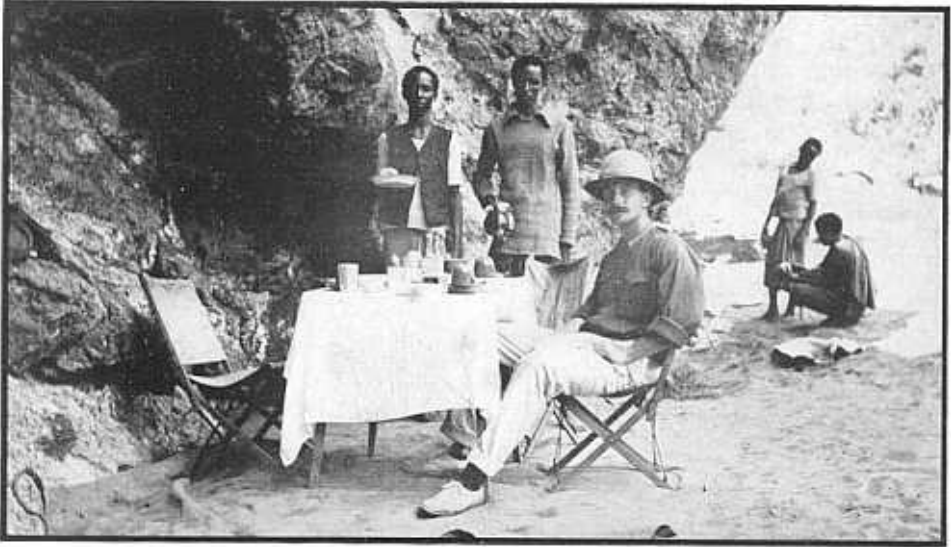


FIG. 85

Col. R. E. Drake-Brockman, Ethiopia, 1909

1908-1912—Drake-Brockman.

Lieutenant-Colonel Ralph Evelyn Drake-Brockman, D. S. O., was born in England in 1875. He is a physician, specializing in tropical diseases. He served as Medical Officer to the troops in the interior of Somaliland from 1904 to 1915, including three campaigns against the Mad Mullah. In the World War he commanded the 150th and 95th British Field Ambulances and was twice mentioned in despatches and decorated with the D. S. O. Since the War he has practiced as a physician in London; but he says: "I left my heart in Africa and, if circumstances permitted, I would go out there again tomorrow and carry on my work."

Col. Drake-Brockman's books include *British Somaliland*, recognized as the standard work on the country, and *The Mammals of Somaliland*. In the former he tells how his servant on one occasion, hearing him say that the scent of a certain flower was very nice, went out and brought him the flower of a *Caralluma*, saying: "Very nice smell, Sahib!" He adds that few natives can differentiate between a sweet smell and a foul one, and that they take no interest in plants, unless they can find in them some immediate economic value.

Col. Drake-Brockman's principal work in natural history was on the fauna, and the thoroughness of his studies can be judged from the fact that no new species or sub-species of animal has been discovered in Somaliland since he left the country in 1915. He did not neglect the flora, and in the field of Stapeliads he discovered *Drakebrockmania crassa*, *Caralluma corrugata* and *C. sacculata*.

1909—Mrs. Pott, Miss Obermeijer—Transvaal Museum.



FIG. 86

Dr. C. E. B. Bremekamp



FIG. 87

Miss A. A. Obermeijer

The handsome new building of the Transvaal Museum on Market Street in Pretoria contains in the botanical section a notable collection of 40,000 specimens. This was largely built up through the efforts of the former botanical assistant, Miss Reino Leendertz, who is now Mrs. R. Pott. She is the co-author with J. Burtt-Davy of the valuable First Check-List of the Flowering Plants and Ferns of the Transvaal and Swaziland, published in the Annals of the Transvaal Museum in 1912 and subsequent years. Mrs. Pott is the discoverer of *Stapelia leendertziae*, and the author of *S. gettleffii*, discovered by G. F. Gettleff.

The present Director of the Transvaal Museum is C. J. Swierstra and the botanical assistant is now Miss A. A. Obermeijer, M.Sc., who is the author of several recently published species of Stapeliads. She is also joint-author with Dr. C. E. B. Bremekamp of *Caralluma vansonii*. Dr. Bremekamp was formerly Professor of Botany at the University of Pretoria and is now residing at Bilthoven, Holland.



FIG. 88

Mrs. Reino Leendertz Pott.

1910—Kirstenbosch: Pearson and Compton.



FIG. 89

Prof. Henry Harold Welch Pearson

From Dedications Volume, Curtis's Botanical Magazine, 1931.



FIG. 90

Prof. Robert Harold Compton

When, in 1903, the munificence of Harry Bolus led to the founding of a Chair of Botany at the South African College in Capetown, H. H. W. Pearson (1870-1916) was appointed as professor to occupy it. He was a young man, "with an almost boyish gait," devoted to the study of cycads and full of an inspiring enthusiasm for botany in all its branches.

In 1910 Prof. Pearson proposed the establishment of a National Botanic Garden at the Cape. To-day his dream stands realized in the matchless gardens at Kirstenbosch, Newlands, six miles from Capetown. Kirstenbosch has an area of 400 acres on the eastern side of Table Mountain, across the foot of the Skeleton and Nursery Gorges, in surroundings unsurpassed for beauty among the botanic gardens of the world.

Prof. Pearson died in 1916 and is buried among his favorite plants, on the Cycad Hill at Kirstenbosch. He was the discoverer of two *Stapelias*, *S. pearsonii* and *S. similis*, collected during an expedition which he headed to Namaqualand and the Orange River in 1910 on behalf of the Sladen Trust, a foundation established in memory of Walter Percy Sladen (1849-1900), English naturalist and scholar.

Prof. Pearson was succeeded as Director of Kirstenbosch by Prof. R. H. Compton, who through the past twenty years has greatly developed the scope and beauty of the gardens. He has recently founded a branch garden at Whitehill, in the Laingsburg district, for the culture of the Karroo flora. Under the care of the Superintendent, J. Archer, Whitehill has already a very fine collection of succulents, and among these the Stapeliads occupy an important place. Prof. Compton himself, with F. J. Cook, was the discoverer about 1928 of *Stapelia nudiflora*.

The Bolus Herbarium of the University of Capetown, at Kirstenbosch, is directed by Mrs. Louisa H. M. Bolus, niece of Harry Bolus, who is also keenly interested in Stapeliads. The invaluable work done for the cause by N. S. Pillans of the Herbarium has already been mentioned.

1910—Sir Thomas Hanbury, Berger.



FIG. 91

Sir Thomas Hanbury

From Dedications Volume, Curtis's Botanical Magazine, 1931.



FIG. 92

Alwin Berger

Stapeliën und Kleinien, Stuttgart, 1910, is one of the admirable series of handbooks on succulents compiled by Alwin Berger. Sold at a moderate price, it is a comprehensive popular account of the Stapeliads, combining formal descriptions of 241 species with much valuable general information. Berger was for many years Curator of the garden of Sir Thomas and Lady Hanbury at "La Mortola," near Ventimiglia, Italy. His wide knowledge of plants enabled him to determine the correct status of many Stapeliads heretofore confused, and he also discovered at "La Mortola" several new hybrids and varieties, the most important of which was *Stapelia bella*. His name is commemorated in that of *Stapelia bergeriana*, dedicated to him by his friend, Prof. Kurt Dinter.

A hybrid of *S. variegata*, *S. hanburyana*, was named by Berger for Sir Thomas, whose devotion to the cause of botany was far-reaching. He was the donor of funds to the University of Genoa to found the Hanbury Institute, presided over for many years by the genial Prof. Otto Penzig. The English novelist, Arnold Bennett, who met Sir Thomas at Mentone in 1904, calls him in his Journal "the Lord God of these parts," and adds: "Sir Thomas has the finest private garden in the world, 100 acres, 5,000 species (some absolutely unique) and 46 gardeners. He is far from an ordinary man and I liked something at the root of him."

At the death of Sir Thomas, the garden passed into the hands of his son. The present curator is S. W. McLeod Braggins, who carries forward the best traditions established by its founder. A recent visitor to "La Mortola" has written us: "During our entire six months abroad, we found no place with the wealth of flowers, the very apparent appreciation for color combinations and landscape effects and the spirit behind the work that was evidenced at 'La Mortola.' "

c. 1912—Archdeacon Rogers.

The Rev. F. A. Rogers was born in England in 1876. He derived a deep interest in botany from his father, the Rev. W. Moyle Rogers, who was an authority on the brambles of Great Britain. After completing his education at Oxford, the younger Rogers went out to South Africa as Railway Chaplain to the South African Railways. The twenty years, 1904-1925, during which he filled this position in the Transvaal, the Rhodesias and the Belgian Congo, gave him an unusual opportunity to study the flora of some of the least known regions of the African continent, and he made remarkable use of the opportunity, collecting over a thousand specimens each year of his stay in Africa. His collections are now scattered among most of the principal European herbaria and the Smithsonian Institute in Washington. In the field of the STAPELIEAE Archdeacon Rogers was the discoverer of *Caralluma rogersii*.

1915—Dummer.

Richard Arnold Dummer (1887-1922) came out to Kenya soon after the World War, in the employ of the Mabira Rubber Company. He worked in the Nairobi and Kikuyu districts, and later in Uganda, where he met an untimely death at the age of 35 in a motor accident. He was a commercial botanist and entomologist, collecting specimens for sale. *Stapelia dummeri*, first introduced by him, was named in his honor.

1920-1936—The Flowering Plants of South Africa.

The Flowering Plants of South Africa is an illustrated quarterly serial, on the model of Curtis's Botanical Magazine, published in England by Messrs. L. Reeve and Company, Bank Street, Ashford, Kent. It was founded in 1920 and, while treating of all South African plants, it has devoted generous attention to the STAPELIEAE, notably in the volumes for 1932, 1935 and 1936, and anyone wishing to have an authoritative record of the more important South African species, old and new, should not fail to subscribe to the magazine. The publisher in Pretoria is J. L. van Schaik, Ltd. The editor is Dr. I. B. Pole Evans, Director of the Botanical Survey of South Africa, and Chief of the Division of Plant Industry of the Department of Agriculture at Pretoria.

The plants figured in this admirable magazine have mostly been cultivated in the grounds of the Union Government Building at Pretoria, a remarkable architectural group, situated half-way up Meintjes Kop, about a mile from the centre and overlooking the city. A recessed colonnade with two domed towers connects the long wings, which have pillared pavilions at the outlying ends, and the central approach is through the beautiful terraced gardens. Among the many Stapeliads grown here are *Caralluma car-nosa*, *C. ubomboensis* and *Huernia transvaalensis*, all three discovered by Dr. Pole Evans;

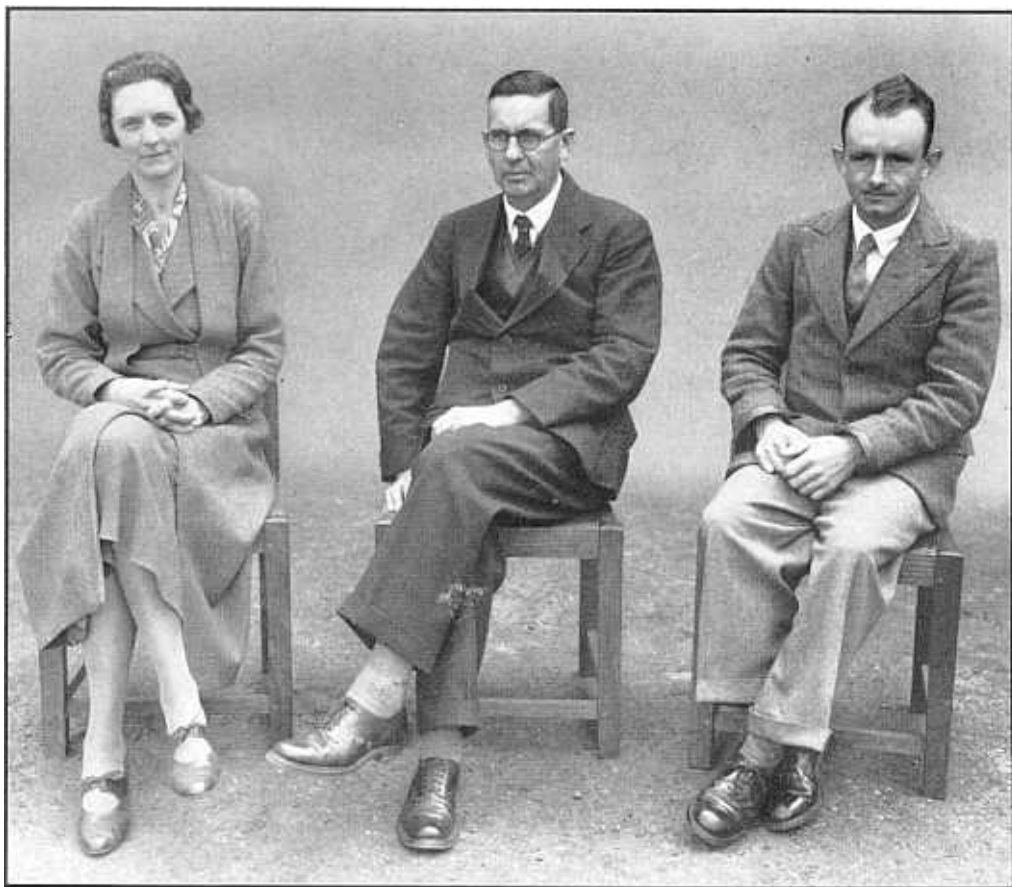


FIG. 93

Miss I. C. Verdoorn, Botanist; Dr. E. P. Phillips, Principal Botanist; and R. A. Dyer, M.Sc., Botanist, National Herbarium, Division of Plant Industry, Pretoria.

Caralluma schweickerdtii, discovered by Dr. H. G. Schweickerdt, Miss I. C. Verdoorn and Miss A. A. Obermeijer; *Huernia vogtsii*, discovered by L. R. Vogts of the Provincial Administrator's Office in Pretoria; *H. nouhuysii*, *Stapelia nouhuysii* and *S. clavicorona*, discovered by J. J. van Nouhuys; *Caralluma knobelii*, discovered by J. C. Knobel of Molepolole; and *C. keithii*, discovered by D. R. Keith.

The descriptions of new Stapeliads in the Flowering Plants of South Africa have been prepared by Dr. E. Percy Phillips, Principal Botanist in charge of the National Herbarium and author of the Genera of South African



FIG. 94

Miss Mary D. Gunn

Plants, 1926; by Miss Inez C. Verdoorn, Botanist of the Division of Plant Industry; by R. A. Dyer, Botanist of the Division; and by Miss A. A. Obermeijer, of the Transvaal Museum. The very beautiful colored plates are mostly drawn by Miss Cythna Letty, artist in the Division of Plant Industry. The Stapeliads have been fortunate in winning the interest of so many members of the Staff in the Botanical Section of the Division. Dr. H. G. Schweickerdt, Agrostologist now on an assignment at the Kew Herbarium, has written several articles dealing with the Transvaal succulents and with individual Stapeliads; and Miss Mary D. Gunn, Librarian, has collected many early references to the tribe from old writers.



FIG. 95
Miss Cythna Letty



FIG. 96
Dr. H. G. Schweickerdt, seated on the summit
of Table Mountain.

1922—Fries.

Huernia keniensis was discovered by two brothers, distinguished Swedish botanists and travelers in tropical East Africa, Professors Robert E. Fries and Thure Fries.

Robert E. Fries (born 1876) is Professor of Botany and Director of the botanical garden known as the Hortus Bergianus at the Royal Academy of Science in Stockholm since 1915.

His brother, Thure Fries (1886-1930) was Professor of Botany and Director of the Botanical Garden at the University of Lund, South Sweden. He died while on a scientific expedition to Rhodesia.



FIG. 97

Prof. Robert E. Fries

1925-1931—Gravely and Mayuranathan.



FIG. 98

Dr. F. H. Gravely

The Bulletin of the Government Museum at Madras, British India, on the Indian Species of the Genus *Caralluma*, Madras, 1931, by Dr. Frederick Henry Gravely and P. V. Mayuranathan, is an indispensable monograph for all students of the Stapeliads. It is distributed by the Government Museum Press at 1 rupee 8 annas. It is fully illustrated and tells the story of this little-known group of species alike from the scientific and from the popular sides. Dr. Gravely is a graduate of Manchester University in England. He came to India, to the Indian Museum in Calcutta, in 1910, and has been Superintendent of the Madras Government Museum since 1920. His writings testify to the unusual range of his interests, covering many fields in zoology, botany, entomology and archaeology, from the Asiatic Passalid beetles to the Hindu metal images and the architecture of the old temples. His associate, P. V. Mayuranathan, has been Botanical Assistant in the Museum since 1920, and he is a specialist in the

succulent species of Indian Euphorbias. He started the Museum Herbarium and the reorganization of the botanical galleries. His writings include the Flowering Plants of Madras City and its Immediate Neighborhood, 1929. He has undertaken several botanical expeditions through the mountainous regions of South India, and is the discoverer of *Caralluma procumbens* and *C. stalagmifera*.

1926—Ross-Frames.

In P. Ross-Frames of Kenilworth, a Vice-President of the Botanical Society of South Africa, the Stapeliads are fortunate in having a very distinguished friend. Mr. Ross-Frames is an ardent and discriminating student in many fields. His collection of diamonds, formed while he was serving as a specialist for the Government, is now among the treasured exhibits of the South African Museum in Capetown. Sea-shells are another of his interests. In botany his special attention centres upon the aloes. In the domain of Stapeliads, besides having discovered three new species, *Caralluma framesii*, *Echidnopsis framesii* and *Piaranthus framesii*, he has rediscovered *Piaranthus decorus*, one of the long-lost plants of Francis Masson.



FIG. 99

P. V. Mayuranathan

1926—Gorini.

Dr. M. Pompeo Gorini is an official of the Italian Colonial Ministry. In 1924 a tract of 33,000 square miles in Kenya, south of the Juba River and known as Jubaland, was ceded to Italy by Great Britain, and now forms the Oltregiuba district of Italian Somaliland. Dr. Gorini was assigned to a post in this region for two years following the cession of the land and while resident there was the discoverer of *Caralluma oxydonta*.

1928—Hurling and Neil.

Messrs. Hurling and Neil, or Neil and Hurling—it does not matter how one places these names—for they always go together, as bachelor friends and life partners. At Bonnie Vale, C. P., they conduct a combined dairy farm and succulent nursery, the widely known Highlands Rockeries Nursery, where one will find rocky slopes grown with countless succulents, well grown because well understood. Genial, enthusiastic Mr. Hurling can make any rare *Stapelia* flourish in the light of his sunny vitality; Mr. Neil, silent and tall, expresses his appreciation by the twinkle of his eyes. Together, their energies have created a unique veld garden. As plant collectors they are known for their discovery of the interesting *Stapelia cylvista*, 1928.

1928—Maire.

Dr. René Maire, director of the botanical service of the University at Algiers, was born at Sons-le-Saunier, Jura, France, in 1878. He has made numerous explorations in the South of Algeria, the most important being an expedition to the Central Sahara in the district of Hoggar, which penetrated the mountain country around Ilaman Mt. as far south as Tamanrasset. It was on this expedition that Dr. Maire discovered *Caralluma venenosa*. He is also the discoverer of *C. hesperidum*.



FIG. 100
Dr. R. Ma

1929—Senni.

Dr. Lorenzo Senni was born in Rome in 1879, and is Consul in the Fascist Forest Militia. He has conducted forestry explorations in Eritrea at different epochs, notably in 1906 and 1929, and in the latter year he made an important forestry and botanical survey of Italian Somaliland at the invitation of the Governor, Dr. Guido Corni. One of the fruits of this survey was his discovery of *Caralluma mogadoxensis*.

1929—Nel and Herre.



FIG. 101
Hans Herre

Prof. Gert Cornelius Nel was born at Greytown, Natal, in 1885. After graduating in science from the Victoria College, Stellenbosch, he went to Germany and received his Doctorate in botany under Prof. A. Engler. He now occupies the Chair of Botany at the University of Stellenbosch, where he has interested himself in founding a botanic garden in connection with the University. The garden has an outstanding collection of South African succulents, among which the Stapeliads enjoy a very full representation. In 1925 Hans Herre was appointed the first curator of the Garden. Mr. Herre was born in Dessau, Germany, in 1895. His father and grandfather were both well-known gardeners, and he adopted the same profession. He passed his apprenticeship in the famous old park of Woerlitz, near Dessau. Later he became gardener and lecturer on horticulture at other points in Germany, Belgium and Roumania. Dur-

ing the World War he served on the western front until he was severely wounded and disabled. Since his appointment at Stellenbosch, he has explored extensively in Little Namaqualand and the Karroo, and is the discoverer of *Stapelia herrei*, *Trichocaulon columnare*, *T. kubusense* and *Stapelia neliana* (see Appendix F). The last named commemorates the services of Dr. Nel in determining and describing many of the recently discovered Stapeliads from Little Namaqualand and South West Africa. Dr. Nel has explored in many sections of South West Africa, the Kalahari and Portuguese East Africa, and he is the discoverer of *Caralluma kalaharica*, *Hoodia montana*, and several other new species.

1930—van Son.

G. van Son is the entomologist of the Transvaal Museum in Pretoria, famous for its natural history collections, including the great Brauns collection of South African bees.

"I was born," Mr. van Son tells us, "in 1898, in the Castle Gorodischtsche, belonging to my grandmother, Countess Kamarowsky. Needless to say, the place was in Russia (pro-



FIG. 102

Dr. G. C. Ne



FIG. 103

G. van Son

vince of Orel) and it has been duly destroyed since. I had my education at home until big enough to enter a military cadet school and, later, the Naval Corps; I missed my final examinations for naval officer by a couple of months, when the revolution started. I spent four rather instructive although not always pleasant years, during which my father was shot and my mother and even my grandmother were sentenced to death (probably on account of having a nine-pointed crown in their coat-of-arms!), but subsequently released by sheer luck when one of the Che-ka officials turned out to be a personal friend from a neighboring village." In 1921 Mr. van Son went to Holland, and after doing some Museum work there

he went out to South Africa in 1923 as assistant to Prof. A. J. T. Janse, author of a monumental work on the moths of South Africa and himself long an intensive collector of Stapeliads.

Mr. van Son was the entomologist on the Vernay-Lang Kalahari expedition in 1930. Botany has always been a great interest of his, and on this trip he found opportunity to make a splendid botanical collection of 1800 specimens and was the discoverer of *Caralluma vansonii*. On another expedition he discovered *Huernia bicampanulata*.

1932—Decary.

Raymond Decary was born at Méry sur Seine, France, in 1891. He has lived in Madagascar since 1916 and is Provincial Commissioner for the Southern District. His official duties include the supervision of customs, roads, crops, schools and many other activities; but he has found time as well for a scientific study of the geology, flora and ethnography of the island, and he has written many papers, books and pamphlets on these subjects, the most important being a two volume account of L'Androy, the extreme southern district of the island, 1930-33. He is a correspondent of the Paris Museum of Natural History, and has made several scientific expeditions for the Museum as well as for the French Geographical Society. He is the discoverer of the only three species of Stapeliads known from Madagascar, *Stapelianthus decaryi*, *Trichocaulon decaryi* and *Stapelianthus madagascariensis*.



FIG. 104
Raymond Decary

1933—Lang.

Herbert Lang, who was born in Oehringen, Germany, in 1879, has been an explorer in many parts of Africa. Among his journeys may be cited the expedition he led to the Belgian Congo in 1909-15 on behalf of the American Museum of Natural History, his explorations in Angola in 1925 and his joint expedition with Arthur S. Vernay through the Kalahari desert in 1930.

Mr. Lang is widely known for his beautiful photographs of African scenery and antiquities, animals and flowers. Many of these have been reproduced in the South Africa Pictorial Calendars he has published annually during the past four years. Stapeliads have interested Mr. Lang for many years, and his photographic studies of them cover a very large number of species. With E. Schweickerdt he is the discoverer of two *Hoodias*, *H. langii* and *H. rosea*, collected on a trip in British Bechuanaland in 1933.

Mr. Schweickerdt, a brother of Dr. H. G. Schweickerdt, is an art dealer, whose chief hobbies are motor cars and the South African fauna. He has accompanied Mr. Lang on several expeditions to photograph wild animals in their native haunts.

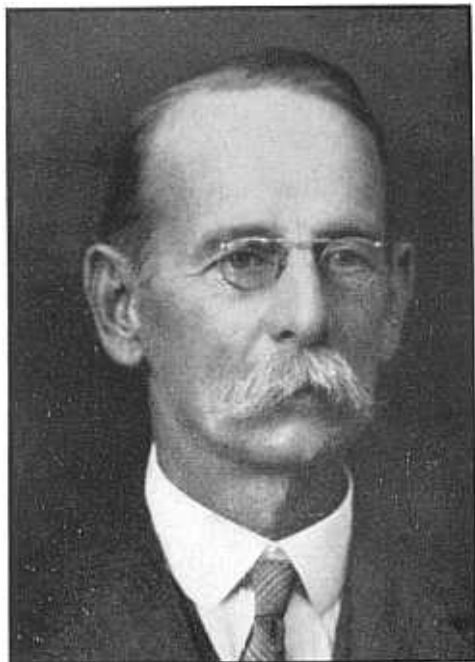


FIG. 105
Dr. J. Luckhoff



FIG. 106
Carl A. Luckhoff

1933—Luckhoff.

Dr. J. Luckhoff is a physician in Capetown. His young six-foot son, Carl, is a student at the Medical School in that city. Father and son were for many years friends of Dr. Marloth and most of the latter's field work in the Western Provinces was done in their company. Under this stimulating influence, Carl Luckhoff began to show an unusual talent for drawing at the age of seven, and soon was making a specialty of the STAPELIEAE. To-day his portfolio numbers nearly three hundred plates, many of which have been the result of three or four hours work of an evening, after a long day at the Medical School. His drawings, as evidenced by those we are privileged to reproduce in this book, reveal a high degree of concentration and botanical knowledge, combined with a sense for fresh clean colors and excellent atmosphere.

Dr. Luckhoff is the discoverer of *Stapelia dwequensis*, *Pectinaria tulipiflora* and Carl Luckhoff is the discoverer of *Huernia witzenbergensis*. We have dedicated the genus *Luckhoffia* in honor of the father and son who have done so much for the *Stapelia* cause, alike in the fields of discovery, cultivation, description, revision, photography and painting.

Collectors at the Cape.

There have been many collectors in the Cape Province, not otherwise mentioned in these notes, who have done their share in furthering the knowledge of the STAPELIEAE by their discoveries of new species. Dr. John Shaw, professor of physical sciences in the South African College, Capetown, collected *Piaranthus pulcher* in 1873. About the be-



FIG. 107

C. Beukman, preparing *Trichocaulons* and *Tavaresias* for his rockery at Bonnie Vale, C. P.

ginning of the present century, Capt. E. Alston of Ceres discovered *Trichocaulon alstoni* and *Hoodia albispina*; Miss Hester Thomson discovered *Huernia simplex*; H. E. Lee, sheep farmer near Klipplaat, discovered *Trichocaulon annulatum*; Mr. Ayres, for many years a nurseryman at the Cape Peninsula, discovered *Caralluma inversa*; another nurseryman at the Cape, R. Templeman, discovered *C. acutiloba*; Mr. Rabjohn discovered *Huernia decemdentata*; and C. Piers, a land surveyor in Rhodesia, discovered *H. piersii*. During the past ten years there has been an increasing interest in the search for new species, reflected in the formation of several Wild Plant Societies, notable among them the Succulent Society of South Africa, of which Mrs. D. van der Bijl of Great Brak River was the first President. Mrs. van der Bijl was herself the discoverer of

Stapelia bijliae. Other recent discoveries have been *S. immelmaniae* by Mrs. Immelman of Piquetberg; *S. longii* by F. R. Long, Superintendent of Parks in Port Elizabeth; *Caralluma maughani* by Dr. R. Maughan-Brown; *C. cincta* by Richard Primos of Capetown; *Luckhoffia beukmanii*, *Stapelia arenosa* and *S. stultitoides* by C. Beukman, school-teacher of Bonnie Vale; *Caralluma villetii* by Dr. and Mrs. C. T. Villet; and *Piarranthus mennellii* and *P. pallidus* by Brian T. Mennell of Louisvale.

Recent collectors in Rhodesia.

The study of Stapeliads in the Rhodesias has been greatly stimulated in the last few years by the formation of two Succulent Societies. The Society in Salisbury, Mashonaland, includes among its members L. S. A. Vereker, discoverer of *Huernia verekeri*, and Miss G. Clarkson. The Society in Bulawayo, the Wild Plant Society of Matabeleland, has an enthusiastic collector, Rev. Neville Jones, as President. Capt. R. H. R. Stevenson, an engineer on roads and bridges and the discoverer of *Stapelia discoidea*, was especially active in organizing this Society. Its membership is already about 50 and includes Mr. and Mrs. Frank Porter (Mrs. Porter being the first Honorary Secretary), Mrs. P. Fletcher, Mrs. R. A. Fletcher and Dr. George Arnold, Director of the Rhodesian Museum in Bulawayo. Mr. Porter, a land surveyor for the Rhodesian Railways, born in Capetown, 1882, is one of the few collectors who have had opportunity to hunt Stapeliads in Northern, as well as in Southern, Rhodesia. A very active collector in the western district of Wankie is B. Levy, a pharmaceutical chemist, born in Connecticut, U. S. A., in 1896. Mr. Levy is the discoverer of *Huernia levyi* and *Caralluma piarranthoides*. He describes himself as one of "the usual type of collectors for their interest and study, and as the uninitiated would say, bordering on insanity," and he adds: "The mere fact that horticulture is such a difficult proposition here acts as a stimulus to my endeavors. Termites, temperature, droughts and locusts are our chief enemies. The last named recently devoured nearly the whole of my garden. We had the swarm around for four days in succession."

Other discoverers of Stapeliads in Southern Rhodesia have been R. G. N. Young (*Stapelia youngii*) and Mr. Hislop (*Huernia hislopii*).

In Northern Rhodesia a very well-known collector is Sydney Tapscott of the N'Kana Mine at Broken Hills, discoverer of *Stultitia tapscottii*. He has collected in Griqualand West, Bechuanaland and Rhodesia, and his photographs of Stapeliads, now at the Bolus Herbarium in Kirstenbosch, are among the finest of their kind, as readers of the present book can testify. Another very keen collector in Northern Rhodesia is W. M. Younger of Livingstone.



FIG. 108
L. S. A. Vereker



FIG. 109
Frank W. Porter

Recent collectors in South West Africa.

On one of his first expeditions to South West Africa, Prof. Dinter met Ernst Rusch, the owner of a succulent nursery near Windhoek. Mr. Rusch was born at Mühlhausen, Germany, in 1867 and came to South West Africa in 1890. He soon began to collect and grow the native succulents and, as a demand for these plants arose, he established a nursery near his home, Farm Lichtenstein. Prof. Dinter found the nursery of Mr. Rusch so helpful a place for the study of plants, that he brought all his own discoveries there for observation, and the collection grew so rapidly that prior to the heavy rains of 1932-33 it embraced 800 different species. Many were lost during that winter, and they are only now being replaced. Mr. Rusch and his son, Ernst Rusch, Jr., have made many extended botanical trips, on several occasions in company with Prof. Dinter, who christened one of his own discoveries, *Stapelia ruschiana*, in honor of his friend. Ernst Rusch, Jr., is the discoverer of *Hoodia ruschii*, *H. whitesloaneana* and *Stapelia longipes*.

A very important nursery at Windhoek is that of Wilhelm Triebner, the South West

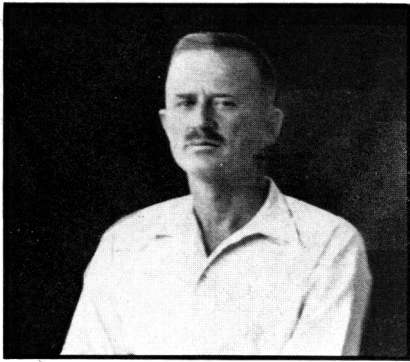


FIG. 110
Ernst Rusch, Jr.

Africa Succulents Nursery, established in 1930. Mr. Triebner was born in Germany in 1883 and came to South West Africa in 1904. He now spends four or five months each year collecting in the Namib, Kalahari, Omaheke and Namaqualand regions, and raises about 35,000 plants annually at his nursery, including more than 5,000 plants of his favorite *Stapeliads*. He has specialized in the *Hoodias*, of which he possessed at one time 64 different species and forms, the great majority undescribed. The torrential rains of the last few winters destroyed almost the entire group. Mr. Triebner is the discoverer of *Hoodia triebneri*, *Hoodiopsis triebneri*, *Trichocaulon triebneri*, *Stapelia auobensis* and other new species.

Other collectors in South West Africa include Dr. Boss, discoverer of *Hoodia gibbosa* and *H. husabensis*; Mr. Pesch of Omaruru, Hereroland, discoverer of *Caralluma peschii*; and Mr. Berger of Haruchas, Great Namaqualand, discoverer of *Stapelia marientalensis*.

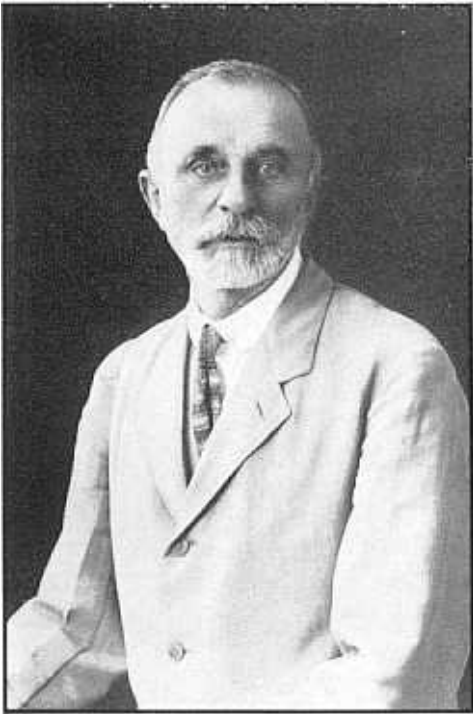


FIG. 111
Ernst Rusch



FIG. 112
Wilhelm Triebner



FIG. 113

Stapelia leendertziae N. E. Brown

Used as part of the composition in a water color drawing by Mrs. Letty, together with a blue *Babiana* (above), the pink *Striga lutea* (below) and the edible fruits of *Chrysophyllum magaliesmontanum* and *Landolphia capensis*.

THE GENERA AND SPECIES

KEY TO THE GENERA.

- A. Stems bearing fleshy leaves 1. *Frerea*
- AA. Stems leafless, or bearing only rudimentary leaves:
 - B. Corolla-lobes connate at the tips (Stems 4-8 angled) 9. *Pectinaria*
 - BB. Corolla-lobes not connate at the tips:
 - C. Corolla with intermediate lobes or points at the sinuses between the lobes:
 - I. Outer corona arising from the staminal column in an erect diverging crown (Stems 6-8 angled) 13. *Stapelianthus*
 - II. Outer corona sessile, or adnate to the base of the corolla, or absent (Stems 4-24 angled) 12. *Huernia*
 - CC. Corolla without intermediate lobes or points at the sinuses between the lobes:
 - I. Stems with tessellate cylindric angles (Stems 6-10 angled). 15. *Echidnopsis*
 - II. Stems with tuberculate angles (Stems 6-30 or more angled):
 - a. Stem-tubercles tipped with 3 bristles (Stems 6-12 angled) 20. *Tavaresia*
 - b. Stem-tubercles not tipped with 3 bristles:
 - 1. Stems 7-9 angled; tubercles ending in indurated points or short spines:
 - i. Inner corona-lobes 1-horned 19. *Luckhoffia*
 - ii. Inner corona-lobes 2-horned 18. *Hoodiopsis*
 - 2. Stems 12-30 or more angled:
 - i. Limb of the corolla nearly entire, the almost obsolete lobes reduced to subulate points; corolla 1-8 inches in diameter; stem-tubercles tipped with stiff bristles 17. *Hoodia*
 - ii. Limb of the corolla distinctly lobed; corolla under 1 inch in diameter; stem-tubercles pointless, or tipped with a spine or hair . 16. *Trichocaulon*

- III. Stems 4-6 angled; angles acutely or obscurely toothed, or without teeth:
- a. Outer corona long-tube-shaped, with short incurved lobes 7. *Stapeliopsis*
 - b. Outer corona cup-shaped, or annular and appearing 1-seriate with the inner corona; entire or toothed; or of 5 small pouches; or of 5 lobes, more or less intergrown at the base, and more or less adnate to the inner corona-lobes, or nearly free:
 - 1. Inner corona stipitate 4. *Drakebrockmania*
 - 2. Inner corona not stipitate:
 - i. Tips of inner corona-lobes dilated 5. *Edithcolea*
 - ii. Tips of inner corona-lobes not dilated:
 - x. Corolla with a secondary tube arising from the centre of the disk 8. *Diplocyatha*
 - y. Corolla with a broad cushioned annulus 3. *Stultitia*
 - z. Corolla without a secondary tube or cushioned annulus 2. *Caralluma*
 - c. Outer corona of 5 spreading lobes, free to their base 6. *Stapelia*
 - d. Outer corona forming a solid disk 10. *Duvalia*
 - e. Outer corona absent, or the lobes represented by short thick basal teeth, longitudinally folded into a channel, on the two sides of the inner corona-lobes 14. *Huerniopsis*
 - f. Outer corona absent; inner corona-lobes with a dorsal crest 11. *Piранthus*

FREREA Dalzell, Journ. Linn. Soc., viii. 10. 1865.

A low branching perennial *herb*, with whitish terete round succulent *stems* and very shortly petio-
late oblong fleshy leaves; *flowers* flatly rotate, glabrous; *outer corona* bowl-shaped, with short
broad sinuate-truncate lobes; *inner corona*-lobes growing out of the outer corona rim between the
outer corona-lobes, incumbent on the anthers and truncate at the apex.

A monotypic genus, of which the single species *Frerea indica*, was discovered by N. A. Dalzell, Superintendent of the Bombay Botanical Gardens in Feb., 1864, growing in large flattish patches on bare rock hill-side, at an altitude of 3000 feet in the hill country near Poona, 65 miles south-east of Bombay. *F. indica* long baffled the efforts of other collectors, until rediscovered a few years ago by the late Mr. Ranade. Dalzell named the genus for Sir Henry Bartle

Frere, "not only as a mark of esteem and respect, but also because he always has been the enlightened encourager and promoter of scientific researches in India, and is himself a close observer of nature." The genus *Frerea* differs from *Caralluma* only in the remarkable feature that its stems bear true leaves. The corona and other details of the floral structure present no characteristics which are not to be met with in *Caralluma*.

1. *Frerea indica* Dalzell, Journ. Linn. Soc., viii. 10. 1865.

(Description summarized from that by N. A. Dalzell, l.c., translated from the Latin):

Plant: a rock-loving caespitose low branching herb, with whitish smooth stems and oblong fleshy shortly petiolate leaves;

Flowers: solitary, extra-axillar;

Pedicel: very short;

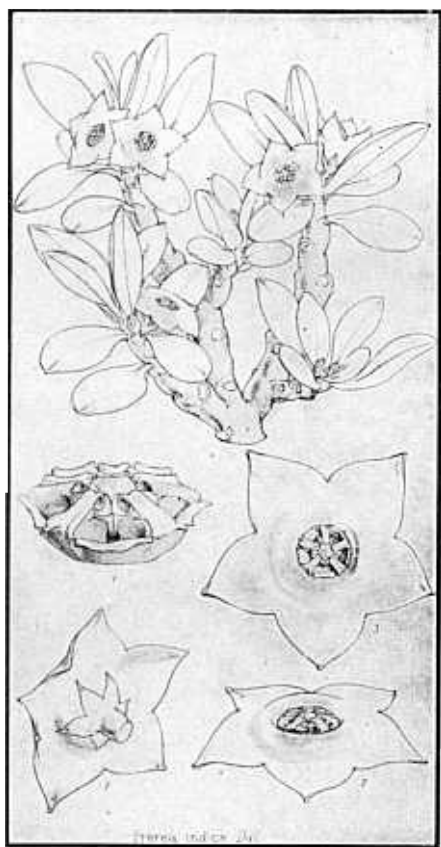
Corolla: glabrous, rotate; lobes broadly triangular, ciliate with a few flattened hairs; sinuses between the lobes small and acute;

Outer corona: lobes very short, broad, sinuate-truncate;

Inner corona: lobes strap-shaped, incumbent over the anthers, truncate at the apex.

Type locality: India: Bombay Presidency: Concan, on a hill-fort near Poona.

Distribution: Not further recorded.



indica Dalzell x 0.75
 il of the Linnean Society

The "Indian *Frerea*" stands out among all *Stapeliads* because it possesses real leaves, thus constituting a link between the leafless species of more arid areas and the remaining tribes of *Asclepiads*. The leaves are about an inch long, succulent, with very short petioles. They cluster around the upper half of the stems. The stems are 4 to 5 inches high and under a half-inch thick. The flowers are numerous and grow near the apex of the branches and appear to be about $1\frac{1}{2}$ inches in diameter, flat save for a shallow central depression containing the corolla. Dalzell states that they are of a purplish-red color, "with an irregular small pale yellow spot in the middle of each lobe." The corona is dark purple; the staminal column at its apex is of a pearly lustre; while the anthers, "which are quite exposed, are of a fine red color, their bases diverging, and having a line of a transparent golden, or amber color along their inner margin, the gland connecting them being of a bright ruby color. The whole central part is like a little gem—a pearl set around with small rubies."

CARALLUMA R. Brown, Mem. Wern. Soc., i. 14. 1811.

- Desmidorchis* Ehrenberg, Linnaea, 94. 1829.
Boucerosia Wight et Arnott, Contrib. Bot. Ind., 34. 1834.
Hutchinia Wight et Arnott, Contrib. Bot. Ind., 34. 1834.
Apteranthes Mikan, Nov. Act. Nat. Cur., xvii. 594. 1835.
Sarcocodon N. E. Brown, Journ. Linn. Soc., xvii. 170. 1878.
Quaqua N. E. Brown, Gard. Chron., xii. 8. 1879.
Spathulopetalum Chiovenda, Ann. di Bot., x. 392. 1912.
Sarcophagophilus Dinter, Succ.-Forsch. Südw.-Afr., i. 78. 1923.

(Description by Dr. N. E. Brown, Flora Cap., iv. i. 872):

- Plants*: dwarf succulent leafless herbs, with stout 4 to 6 (very rarely 3)-angled *stems* and branches, toothed or toothless along the angles;
Flowers: variable, usually in fascicles, rarely solitary, near or at the base, apex, or along the grooves between the angles, in a few species racemose along the attenuated terminal part of the stems;
Calyx: 5-partite;
Corolla: 5-lobed, with a small or very rarely large campanulate or saucer-shaped *tube*, or rarely without a distinct tube and the united part nearly flat and disk-like; *lobes* free at the tips, very spreading or ascending, ovate to linear;
Corona: usually distinctly 2-seriate; or sometimes both series combined so as to falsely appear 1-seriate;
Outer corona: of 5 distinct entire or bifid lobes, or united into an entire or 5 to 15-toothed cup;
Inner corona: of 5 filiform, subulate, linear, oblong, subquadrate or hemispheric lobes, shorter than to much longer than the anthers and often dorsally connected to the outer corona;
Staminal column: stamens with their filaments connate into a tube around the ovary and adnate to the dilated style-apex; *anthers* free, ascending or inflexed upon the style-apex; *pollen-masses* solitary in each anther-cell, ascending or subhorizontal, pellucid just under the apex or within the inner margin, attached in pairs by short slender caudicles to the pollen-carriers or to wing-like expansions of them.

Type species: *Caralluma adscendens*.

Total species: 105+.

Distribution: India, Baluchistan, Afghanistan, Ceylon, Palestine, Arabia, Socotra, the Mediterranean islands, Spain, and North, Tropical and South Africa.

The genus *Caralluma* was established by the great English botanist, Robert Brown, in an address delivered before the Wernerian Society in London in 1809 (printed in 1811). His type species was *C. adscendens*, and in coining the new generic name he evidently had in mind the statement of Dr. William Roxburgh (Plants of the Coast of Coromandel, 1795) that this plant was known to the Telingas of British India as *Car-Allum*. The derivation indicates that Brown intended the word to be accented on

the second syllable, *Carálluma*. Commenting on this derivation, Mr. Mayuranathan has written us: "So far as it has come under our inquiries, no Telugu (Telinga) calls *C. adscendens* by any such name as Car-Allum. But we have not traversed every part of the Telugu country and it is possible that in some area where Roxburgh found the plant it might be so called. For the present, however, the etymology of *Caralluma* must be considered as lost in obscurity."

Caralluma is the backbone of the tribe STAPELIEAE. It is in every respect indistinguishable from *Frerea*, which appears to represent the most ancient surviving embodiment of the tribe, except that its stems no longer bear fully developed leaves. The

mention Ceylon, Baluchistan, Afghanistan, Spain and the Mediterranean islands. None have been reported from any part of Iran, but this may be due not so much to their actual absence from the country as to our ignorance of the flora of the mountain slopes and valleys north of the Gulf of Oman.

Prof. Dinter once made the amusing remark that it is difficult to define the genus *Caralluma* because all Stapeliads have been included in it, for which no place could be found elsewhere. Or we might say that *Caralluma* circumscribes the entire tribe of

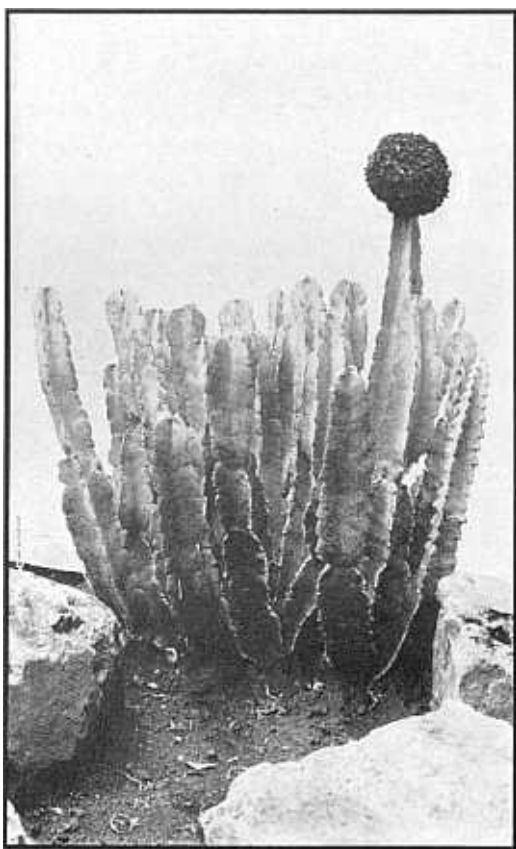


FIG. 115

Caralluma adscendens var. *attenuata*
Gravely et Mayūranathan

Example of *Caralluma* (Key: Group I: *Eucaralluma*) showing stems greatly attenuated at the apex as compared with the base. From Mayuranathan: Flowering Plants of Madras City, 1929.

distribution of the genus is very extensive, beginning near the "Road to Mandalay" in Burma and continuing to within cannon-shot of Capetown. It girdles a third of the globe and spans seventy degrees of latitude. In this long range there is hardly a country where moderately dry climatic conditions exist that does not shelter one or more species. There are a dozen *Carallumas* in India, another dozen in Arabia, more than two dozen at the Cape, with representatives in almost every other part of Africa, not to



Caralluma retrospicens (var. *glabra* ?)
N. E. Brown x 0.12

Example of *Caralluma* (Key: Group II). *Boucerosias* with flowers in terminal umbels. Photo by Mrs. E. R. Molony of a plant from Kenya.

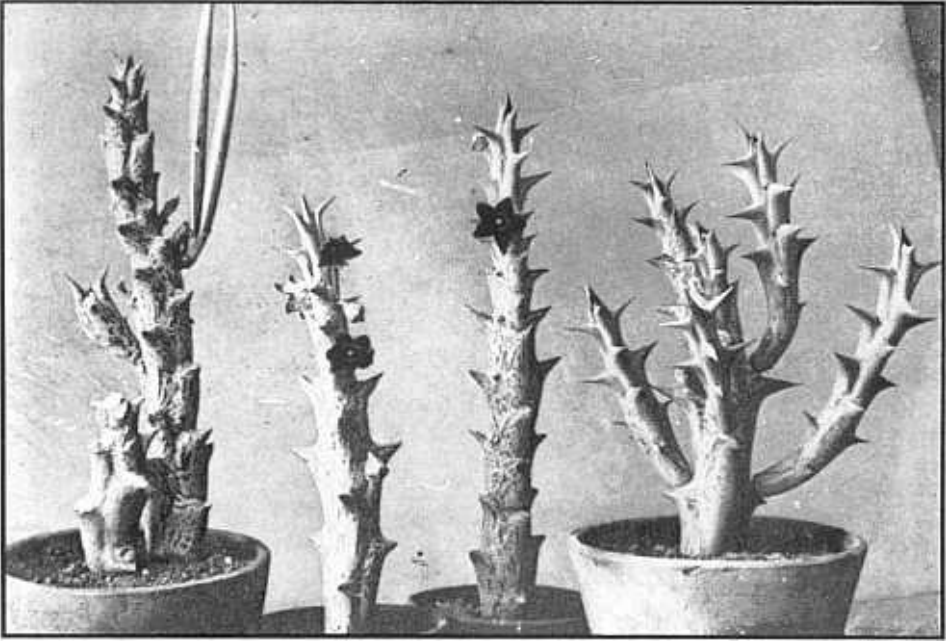


FIG. 117

Caralluma besperidum Maire x 0.33

Example of *Caralluma* (Key: Group V). Ango Group. *Boucerosias* from Africa north of the Equator, with flowers solitary or in lateral fascicles, and stems with stout conical tapering teeth. Photo by E. Jahandiez.

STAPELIEAE, and that the other genera are simply amputations, large and small, made possible by some real or artificial distinction, sometimes not a little far-fetched. When all these amputations have been taken into account, the species which remain constitute this genus we call *Caralluma*. So unwieldly a conglomeration is a constant spur to the botanist to discover logical grounds for new surgical operations; but these are not always easy to perform, as witness the fate of *Quaqua* and *Apteranthes*, *Desmiodorchis* and *Sarcocodon*, and the other amputated members which have refused to remain severed.

At present we recognize 19 Stapeliad

FIG. 118

Caralluma mammillaris N. E. Brown x 1.

Example of *Caralluma* (Key: Group VI). *Boucerosias* from Africa south of the Equator, with flowers solitary or in lateral fascicles, and stems principally 5 to 6-angled. From the collection of Mrs. Helen McCabe.

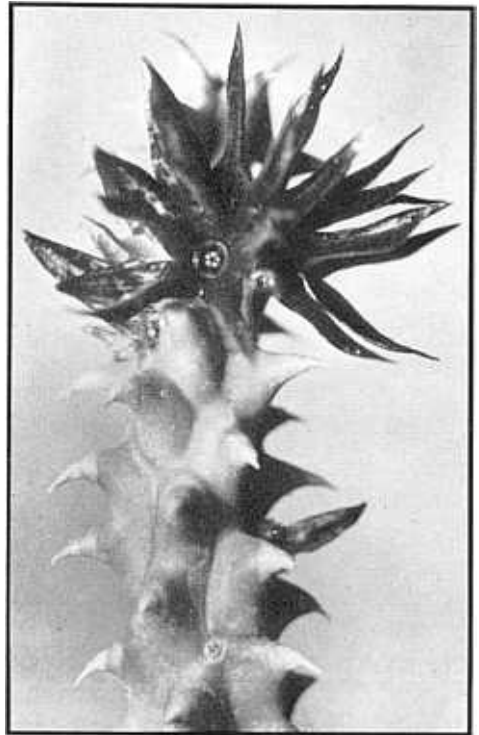




FIG. 119

Caralluma hottentotorum N. E. Brown x 1.5

Example of *Caralluma* (Key: Group VII). *Boucerosias* from Africa south of the Equator, with flowers solitary or in lateral fascicles, and 4-angled stems; corolla 1 inch or less in diameter, with a distinct tube.

genera outside of *Caralluma*, and it would be instructive to analyze in detail just how closely each of them is related to this backbone of the tribe. In *Frerea*, as already noted, the distinction is simply a matter of the leaves not having yet dwindled away and almost disappeared; in *Trichocaulon* and *Echidnopsis* it depends solely on the characteristics of the stems; in *Stultitia* the

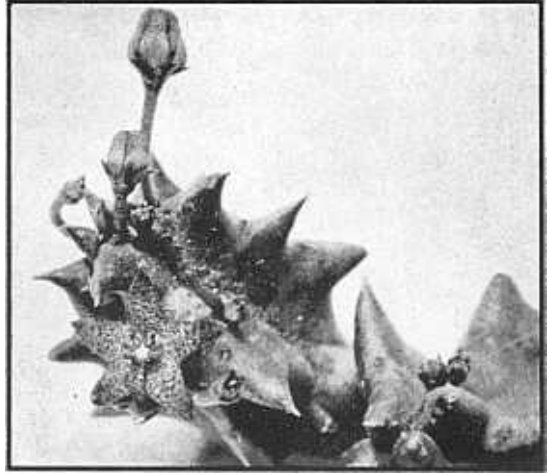


FIG. 120

Caralluma marlothii N. E. Brown x 2.

Example of *Caralluma* (Key: Group VIII). *Boucerosias* from Africa south of the Equator, with flowers solitary or in lateral fascicles, and 4-angled stems; corolla 1 inch or less in diameter, without a distinct tube.

corolla has a thickened annulus; in *Edithcolea* the only difference is that the inner corona-lobes are dilated at the tips; in *Drakebrockmania* the inner corona is stipitate. More distinct are such genera as *Huernia*, with its intermediate corolla points at the sinuses between the lobes, and *Duvalia*, with the outer corona transformed to a round disk; but even in such remoter relationships traits of an unmistakable *Caralluma* ancestry are often seen, such as the frequent bending over of the inner corona-lobes upon the anthers. And finally when we come to the great genus *Stapelia*, we shall find no single feature upon which to base a complete and logical separation.

The best definition of *Caralluma* then would seem to be a purely negative one. It is, we might say, the *Stapeliad* genus in which the leaves are not fully developed, as in *Frerea*; the stems not tessellate, as in *Echidnopsis*, nor many-angled and tuberculate, as in *Hoodia* and *Trichocaulon*, *Hoodiopsis* and *Luckhoffia*; the corolla not furnished with a large annulus, as

in *Stultitia*, nor with the lobes connate at the tips, as in *Pectinaria*; the outer corona not disk-like, as in *Duvalia*; and the inner corona-lobes not dilated at the tips, as in *Edithcolea*, nor stipitate, as in *Drakebrockmania*.

About the only positive things one can say of *Caralluma* derive from its being in theory, if not always in fact, the exact negative of *Stapelia*. For, if in *Stapelia* the outer corona-lobes are defined as being free to the base (a definition which overlooks several exceptions) and the inner corona-lobes as not adnate to the outer corona (another definition with more than one blind spot), then we may say of *Caralluma* that, subject to the limitations already cited as to leaves and stems, corolla and corona, it includes all the Stapeliads whose flowers have the outer corona-lobes more or less intergrown with each other, and the inner corona-lobes more or less adnate to the outer corona.

The picture evoked by so diluted a definition is a faint one at best, yet one can find in it the most amazingly varied embodiments of the Stapeliad spirit. In the section which Schumann called *Eucaralluma*, the plant stems are long and taper to a slender tip, sometimes nearly cylindrical; in the large section of the *Boucerosias*, the stems are more nearly of an even thickness throughout; almost always they are glabrous, but there appear to be two exceptions (*C. huillensis* and *C. torta*); in certain species (as in *C. rivae*) some of the stems have only three angles, in others (as in *C. mammillaris*) they have five or six, while nine out of ten of all the species have uniformly four angles; sometimes (as in *C. longipes*) the stems are only an inch long, while *C. retrospectiens* var. *tombuctuensis* has stems standing over four feet high, and *C. procumbens* trails its prostrate branches along the rocks for six feet or more. The size of the flowers varies from an eighth of an inch (*C. sinaica*) to more than five inches in diameter (*C. lateritia* var. *stevensonii*); some

flowers grow singly along the sides of the stems, erect or pendulous, others in lateral fascicles, while still others cluster in great compound terminal umbels comprising 100 or more individuals. Usually the flowers have some semblance of a corolla-tube, but



FIG. 121

Caralluma aperta N. E. Brown x 1.

Example of *Caralluma* (Key: Group IX). *Boucerosias* from Africa south of the Equator, with flowers solitary or in lateral fascicles, and 4-angled stems; corolla over 1 inch in diameter; stems not distinctly toothed. From the original water color drawing by Miss Cythna Letty for the Flowering Plants of South Africa, 1932.

many are tubeless; often the corolla-lobes are broadly deltoid, at other times they are long and narrow (as in *C. vansonii*), while in *C. luntii* they are raised erect in thin plates, nearly touching at the tips, and in *C. torta* they are actually entwined for half their length. Often the inner corona-lobes are incumbent upon the anthers, but there are very important exceptions, as in *C.*

rogersii and in the whole *lutea-lateritia* group; often the outer corona is cup-shaped with more or less distinct lobes, or formed of little intergrown pouches; in a few instances, as in *C. quadrangula*, *C. maculata* and *C. penicillata*, the collar of the outer corona is devoid of lobes or pouches, serving only to give a foothold to the inner corona-lobes, and in these cases the descriptions sometimes explain the situation not unreasonably by saying that the outer co-

ious coronal manifestations will be found in such species as *C. hottentotum* and *C. intermedia*.

Yet with all the varied embodiments and all the inconsistencies of the genus, with all the baggage it has accumulated in its passage from country to country, from climate to climate, *Caralluma* remains a very vital entity, more and more easily recognized and better appreciated as its long traditions are studied in its different spe-



FIG. 122

Caralluma nebrownii var. *pseudo-nebrownii*, comb. nov. x 1.

Example of *Caralluma* (Key: Group IX.) *Boucerosias* from Africa south of the Equator, with flowers solitary or in lateral fascicles, and 4-angled stems; corolla over 1 inch in diameter; stems distinctly toothed.

rona is absent; in the section which Schumann called *Lalacruma* (included by us among the *Eucarallumas*) the entire corona arises considerably above the base of the staminal column; and still other cur-

cies, beautiful in many of its incarnations, extraordinarily vigorous where it supplants the Euphorbias on some of the mountain slopes of Hadramaut or lavishes its yellow flower-clusters among the rocks of Griqua-

land West, mysterious in the large number of its still imperfectly known species, master of all the STAPELIEAE where the giant clumps of *C. retrospiciens* span 4,000 miles of tropical Africa, probably reserving to future discoverers in many lands more new treasures and surprises than any of the other genera, bearer of the destinies of the tribe from one end of its range to the other.

To compile an easy key to the *Carallumas* is well-nigh a hopeless endeavor. We have availed ourselves to two expedients, dividing the groups according to the native countries of the species, and separating

certain ones on the basis of their stem forms. Emphasis on geographical distribution helps to segregate many of the Arabian and other imperfectly known species and will hardly cause confusion, for at the present time the Arabian species are not found in collections, and the Indian and African ones rarely together, or if together then their origin would probably be known and their identification made easier by the separation. Emphasis on stem form is especially useful in bringing together the species of the Ango Group, which differ widely in flower structure and yet appear to possess a close interrelation.

KEY TO THE GENUS CARALLUMA.

- I. Stems tapering to a long pointed tip (Sec. *Eucaralluma*) Group I
- II. Stems not tapering to a long pointed tip (Sec. *Boucerosia*):
 - A. Flowers in umbels at or very near the apex of the stems (*Umbellata-europaea Group*) Group II
 - B. Flowers solitary or few together, at apex or elsewhere, or in fascicles at the sides of the stems:
 - 1. Species from India, Southern Arabia and Socotra (*Pauciflora-quadrangula Group*) Group III
 - 2. Species from Africa: •
 - a. Species with some or all stems 3-angled, from East Tropical Africa (*Corrugata Group*) Group IV
 - b. Species with stems 4 to 6-angled:
 - i. Species north of the Equator (*Ango Group*) Group V
 - ii. Species south of the Equator:
 - + Stems principally 5 to 6-angled (*Mammillaris Group*) . . . Group VI
 - ++ Stems principally 4-angled:
 - ◇ Corolla 1 inch or less in diameter:
 - * Corolla with a distinct tube (*Carnosa-incarnata Group*) Group VII
 - ** Corolla without a distinct tube (*Marlothii Group*) Group VIII
 - ◇◇ Corolla over 1 inch in diameter (*Maculata-lutea Group*) Group IX

Caralluma. GROUP I. (Eucarallumas).

(Stems, sometimes the flowering stems only, tapering to a long pointed tip).

- I. Species from India:
 - A. Corolla with an inflated tube:
 1. Corolla glabrous and not ciliate 1. *C. edulis* ($\frac{1}{3}$ in.)
 - B. Corolla without an inflated tube:
 1. Corolla with or without hairs on inner face; lobes ciliate with some heavily clavate (stalagmite-like) hairs . . . 2. *C. stalagmifera* ($\frac{2}{5}$ in.)
 2. Corolla with or without hairs on inner face; lobes not ciliate, or ciliate without any stalagmite-like hairs . . . 3. *C. adscendens* ($\frac{2}{3}$ in.)
- II. Species from Southern Arabia:
 - A. Corolla with long soft hairs on inner face; lobes ciliate . . . 4. *C. subulata* ($\frac{1}{2}$ in.)
- III. Species from Sinai:
 - A. Corolla hairy 5. *C. sinaica* ($\frac{1}{8}$ in.)
- IV. Species from Northern and Tropical Africa:
 - A. Corona arising from near the base of the staminal column:
 1. Corolla glabrous:
 - a. Corolla-lobes not ciliate:
 - i. Outer corona-lobes short, under 1 lin. long 6. *C. vittata* ($\frac{1}{2}$ in.)
 - ii. Outer corona-lobes 2 lin. long or more:
 - + Tips of outer corona-lobes diverging 7. *C. longidens* ($\frac{3}{4}$ in.)
 - ++ Tips of outer corona-lobes bent inwards . . . 8. *C. mouretii* ($\frac{3}{4}$ in.)
 - b. Corolla-lobes ciliate with very slender simple hairs . . . 9. *C. mogadoxensis* (2 in.)
 2. Corolla pubescent or hairy:
 - a. Corolla pubescent with very fine hairs and ciliate . . . 10. *C. dalzielii* ($\frac{2}{5}$ in.)
 - b. Corolla densely hairy with spreading clavate hairs . . . 11. *C. dicapuae* (1 in.)
 - B. Corona arising considerably above the base of the staminal column:
 1. Corolla with an inflated tube 12. *C. gracilipes* ($\frac{1}{3}$ in.)
 2. Corolla rotate, lobes very deeply cleft 13. *C. priogonium* ($\frac{1}{2}$ in.)

Caralluma. GROUP II. (Umbellata-europaea Group).

(Boucerosias with flowers in umbels at or very near the apex of the stems)

I. Species from India:

- A. Corolla covered on inner face with small tubercles . . . 14. *C. tuberculata* ($\frac{1}{2}$ in.)
- B. Corolla not covered on inner face with small tubercles:
 - 1. Stems round-angled and spreading underground:
 - a. Corolla ciliate with clavate hairs, otherwise glabrous:
 - i. Outer corona-lobes bifid 15. *C. crenulata* ($1\frac{1}{4}$ in.)
 - ii. Outer corona-lobes truncate 16. *C. truncato-coronata* ($\frac{3}{4}$ in.)
 - b. Corolla with simple hairs on inner face 17. *C. indica* ($\frac{4}{5}$ in.)
 - 2. Stems acute-angled and spreading above ground:
 - a. Corolla deeply campanulate:
 - i. Stems erect; corolla ciliate 18. *C. diffusa* (1 in.)
 - ii. Stems trailing; corolla not ciliate 19. *C. procumbens* ($\frac{1}{2}$ in.)
 - b. Corolla not deeply campanulate 20. *C. umbellata* (1 in.)

II. Species from Southern Arabia and Socotra:

- A. Corolla yellow:
 - 1. Corolla less than 1 inch in diameter 21. *C. aucheriana* ($\frac{1}{2}$ in.)
 - 2. Corolla 1 inch or more in diameter 22. *C. flava* (1 in.)
- B. Corolla sulphur-yellow with dark purple spots 23. *C. awdeliana* ($\frac{1}{2}$ in.)
- C. Corolla pale brown with yellow spots 24. *C. penicillata* ($\frac{1}{2}$ in.)
- D. Corolla dark purple or red:
 - 1. Corolla-lobes a little longer than the tube 25. *C. arabica* ($\frac{1}{2}$ in.)
 - 2. Corolla-lobes shorter than the tube:
 - a. Corolla dark blood-red, with tube $\frac{4}{5}$ in. deep 26. *C. socotrana* ($1\frac{1}{4}$ in.)
 - b. Corolla dark purple, with tube $\frac{2}{5}$ in. deep 27. *C. adenensis* (1 in.)

III. Species from Palestine and Transjordan:

- A. Corolla yellow, banded with purple 28. *C. aaronis* ($\frac{1}{2}$ in.)

IV. Species from Africa, principally north of the Equator, and from the Canary Islands and the islands of the Mediterranean and the Red Sea; varieties of two species are found in Spain:

- A. Flowers in small umbels, less than 20 together:
 - 1. Corolla not with a deeply bell-shaped tube:
 - a. Corolla covered inside with white hairs 29. *C. burchardii* ($\frac{1}{2}$ in.)
 - b. Corolla not covered inside with white hairs:
 - i. Corolla yellow, banded with purple; lobes broadly deltoid 30. *C. europaea* ($\frac{1}{2}$ to $\frac{3}{4}$ in.)
 - ii. Corolla reddish-brown; lobes long and slender 31. *C. munbyana* ($\frac{1}{3}$ in.)
 - 2. Corolla with a deeply bell-shaped tube 32. *C. oxyodonta* ($\frac{3}{4}$ in.)
- B. Flowers in large umbels, more than 20 together:
 - 1. Corolla rotate or campanulate, but not with a deeply bell-shaped tube $\frac{3}{4}$ inch deep:
 - a. Corolla with tufts of hairs at apex of lobes:
 - i. Corolla dark red-brown 33. *C. edithae* ($\frac{1}{2}$ in.)
 - ii. Corolla pale brown with yellow spots 24(a). *C. penicillata* var. *robusta* ($\frac{1}{2}$ in.)
 - b. Corolla without tufts of hairs at apex of lobes:
 - i. Corolla velvety-pubescent 34. *C. somalica* ($\frac{1}{3}$ in.)
 - ii. Corolla sparsely covered with purple hairs, or sometimes glabrous 35. *C. retrospectiens* ($\frac{1}{3}$ to 1 in.)
 - 2. Corolla with a deeply bell-shaped tube $\frac{3}{4}$ inch deep 36. *C. speciosa* ($1\frac{3}{4}$ in.)

Caralluma. GROUP III. (Pauciflora-quadrangula Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary or few together, or in fascicles at the sides of the stems. Species from India, Southern Arabia and Socotra. *C. commutata*, Group V, may also be from Southern Arabia).

- I. Species from India:
 - A. Corolla pale yellow with purple bands 37. *C. pauciflora* (1 in.)
- II. Species from Southern Arabia and Socotra:
 - A. Corolla-lobes not replicate or intertwined:
 - 1. Corolla with concentric rugosities, very dark purple 38. *C. cicatricosa* (2/3 in.)
 - 2. Corolla without concentric rugosities:
 - a. Corolla pale violet; outer corona uniformly bowl-shaped, without lobes 39. *C. anemoniflora* (2 1/4 in.)
 - b. Corolla vermilion-red with some yellow lines; outer corona-lobes cleft almost to the base 40. *C. rosenegrenii* (1 1/2 in.)
 - B. Corolla-lobes replicate and erect:
 - 1. Corolla greenish-yellow; corona appearing 1-seriate 41. *C. quadrangula* (1 in.)
 - 2. Corolla dark purple; outer corona of 5 intergrown pouches, golden-yellow 42. *C. chrysostephana* (1 in.)
 - 3. Corolla greenish-yellow below, purple above and on the margins; outer corona of 5 minute pouches 43. *C. luntii* (1 1/4 in.)
 - C. Corolla-lobes intertwined:
 - 1. Corolla green with purple-brown spots at base; outer corona-lobes deeply bifid 44. *C. torta* (2/3 in.)

Caralluma. GROUP IV. (Corrugata Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary, and with some or all stems 3-angled. Species from East Tropical Africa).

- I. Corolla with campanulate tube and concentric corrugations around tube; corolla-lobes 1/4 inch long 45. *C. corrugata* (3/4 in.)
- II. Corolla with deeply campanulate tube, and concentric markings around tube; corolla-lobes nearly 1/2 inch long 46. *C. rivae* (1 in.)

Caralluma. GROUP V. (Ango Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary or few together, or in fascicles at the sides of the stems. Species from Africa, north of the Equator. Stems mostly 4-angled, often mottled purple-red, and with stout conical pointed teeth.

Flowers in shades of dark purple).

- I. Outer corona unknown. (Stems sometimes 3-angled?) . . . 47. *C. angu* (1 in.)
- II. Outer corona not lobed, annular, truncate, with a sinuate margin 48. *C. sprengeri* (3/4 in.)
- III. Outer corona with pouch-like lobes, more or less completely connate:
 - A. Outer corona-lobes with apex indistinctly crenate . . . 49. *C. decaisneana* (1 in.)
 - B. Outer corona-lobes with thickened edges 50. *C. venenosa* (3/4 in.)
 - C. Outer corona-lobes with apex shortly bifid 51. *C. sacculata* (3/4 in.)
- IV. Outer corona cup-shaped, with the lobes obtuse, not pouch-like:
 - A. Outer corona-lobes broadly rounded, sinuate-crenate at apex 52. *C. baldratii* (1 1/8 in.)
 - B. Outer corona-lobes emarginate between the very obtuse angles 53. *C. hesperidum* (3/4 in.)
 - C. Outer corona-lobes obtuse, bluntly rounded and indented . 54. *C. commutata* (1 in.)
- V. Outer corona with a star-shaped disk and pectinate lobes. (Stems 5-angled?) 55. *C. schweinfurthii* (2/3 in.)

Caralluma. GROUP VI. (Mammillaris Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary or few together, or in fascicles at the sides of the stems. Species from South Africa, with stems not uniformly 4-angled, but principally 5 to 6-angled).

- I. Corolla pubescent or hairy on inner face:
 - A. Corolla densely pilose, more or less greenish; stems obscurely 6-angled, or with obscurely 6-seriate tubercles . . 56. *C. chlorantha* (1/2 in.)
 - B. Corolla pubescent at base, yellow; stems 4 to 6-angled, with stout conical hard-pointed teeth 57. *C. framesii* (3/4 in.)
 - C. Corolla pubescent at base, yellow at base with purple dots, purple above; stems 5 to 6-angled, with stout conical hard-pointed teeth 58. *C. winkleri* (3/4 in.)
- II. Corolla glabrous on inner face:
 - A. Corolla greenish-yellow at base with purple dots, purple above; stems 5 to 6-angled, with stout conical hard-pointed teeth 59. *C. armata* (2/3 in.)
 - B. Corolla yellow in tube with blackish-purple dots, blackish-purple on lobes; stems 5 to 6-angled, with stout conical hard-pointed teeth 60. *C. mammillaris* (1 1/2 in.)
 - C. Corolla dull yellow, with apex of lobes green; stems 5 to 6-angled, with small tubercle-like conical teeth 61. *C. longipes* (1/2 in.)
 - D. Corolla reddish-purple at base, lobes mustard-yellow; stems 6-angled, with spreading hard-pointed teeth 62. *C. maughani* (2/3 in.)

Caralluma. GROUP VII. (Carnosa-incarnata Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary or few together, or in fascicles at the sides of the stems. Species from Africa, south of the Equator, with stems principally 4-angled and flowers 1 inch or less in diameter, with a distinct corolla-tube).

- I. Corolla-tube very small, visible only in cross-section, surrounded by a broad annular thickening of the disk:
 - A. Outer corona-lobes bifid, segments irregularly pectinate . . . 63. *C. piaranthoides* (3/5 in.)
- II. Corolla-tube with a narrow pentagonal annulus at mouth:
 - A. Outer corona-lobes deeply bifid:
 1. Corolla whitish with small purple spots, not ciliate . . . 64. *C. carnosa* (1/3 in.)
 2. Corolla purple-red with a few white spots, with a row of minute hairs slightly within the margin of the lobes 65. *C. keithii* (1/2 in.)
 - B. Outer corona-lobes subquadrate, deeply emarginate:
 1. Corolla purple, mottled with cream 66. *C. fosteri* (3/5 in.)
 - C. Outer corona-lobes with diverging tips:
 1. Corolla wine-red with a few yellow ridges 67. *C. schweickerdtii* (2/3 in.)
- III. Corolla-tube without an annulus at the mouth:
 - A. Corolla pubescent or hairy on inner face:
 1. Corolla pubescent with short purple hairs; purplish-grey with purple-brown spots 68. *C. pillansii* (1 in.)
 2. Corolla with a few hairs at mouth of tube; pale pink to white 69. *C. incarnata* (1/2 in.)
 3. Corolla minutely pubescent at mouth of the whitish tube, lobes blackish-purple 70. *C. ramosa* (1/2 in.)
 - B. Corolla glabrous on inner face:
 1. Corolla-lobes ciliate:
 - a. Corolla light yellow in tube and on upper half of lobes, with basal half of lobes wine-red 71. *C. villetii* (4/5 in.)
 - b. Corolla yellow-green, spotted purple-brown to tips . . . 72. *C. parviflora* (1/3 in.)
 - c. Corolla purple-brown, upper part of lobes grass-green 73. *C. inversa* (1/5 in.)
 - d. Corolla purple-black with concentric yellow lines at base 74. *C. cincta* (4/5 in.)
 2. Corolla-lobes not ciliate:
 - a. Corolla-lobes replicate into linear plates 75. *C. linearis* (1/2 in.)
 - b. Corolla-lobes not replicate into linear plates:
 - i. Corolla pale greenish-yellow 76. *C. hottentotorum* (1/4 in.)
 - ii. Corolla light green, spotted purple-brown to tips of lobes 77. *C. acutiloba* (1/2 in.)
 - iii. Corolla reddish-purple in tube, with radiating white stripes which merge into the greenish-yellow lobes 78. *C. umdausensis* (1 in.)
 - C. Corolla not described, purple-brown (?) 79. *C. wilfriedi* (1/2 in. ?)

Caralluma. GROUP VIII. (Marlothii Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary or few together, or in fascicles at the sides of the stems. Species from Africa, south of the Equator, with stems principally 4-angled and flowers 1 inch or less in diameter, without a distinct corolla-tube).

- I. Corolla pubescent or hairy on inner face:
 - A. Corolla pubescent at apex of lobes only; pale yellow, dotted with red at base of lobes 80. *C. arida* (1/2 in.)
 - B. Corolla pubescent on entire inner face with short white hairs; dark purple-brown 81. *C. pruinosa* (1/2 in.)
 - C. Corolla shaggy on entire inner face with stiff white hairs, yellowish-green 82. *C. peschii* (2/5 in.)
 - D. Corolla covered especially at centre with clavate hairs; light green with purple-brown lines and spots 83. *C. marlothii* (1/4 in.)
 - E. Corolla with hairs on entire inner face, shorter at apex of lobes; pale yellow 84. *C. simulans* (1/4 in.)
- II. Corolla glabrous on inner face:
 - A. Corolla yellow-green with purple-brown lines, tips of lobes dark purple-brown, ciliate 85. *C. dependens* (1/2 in.)
 - B. Corolla dull green, spotted purple-brown (ciliate ?) 86. *C. intermedia* (1 in.)
 - C. Corolla dark purple, not ciliate 87. *C. ubomboensis* (1/3 in.)

Caralluma. GROUP IX. (Maculata-lutea Group).

(*Boucerosias* with flowers not in terminal umbels, but solitary or few together, or in fascicles at the sides of the stems. Species from Africa, south of the Equator, with stems principally 4-angled and flowers more than 1 inch in diameter).

- I. Corona appearing 1-seriate (outer corona annular, without distinct lobes):
 - A. Corolla greenish-yellow with small purple-red spots 88. *C. maculata* (1 3/4 in.)
 - B. Corolla greenish-yellow with red-brown zebra stripes 89. *C. rangeana* (2 in.)
- II. Corona normally 2-seriate (outer corona with distinct lobes):
 - A. Corolla not ciliate:
 1. Stems not toothed or scarcely so:
 - a. Corolla whitish-yellow in tube with purple-brown markings, purplish-brown on lobes 90. *C. aperta* (1 1/4 in.)
 2. Stems with stout teeth:
 - a. Corolla blackish-purple 91. *C. arenicola* (1 1/4 in.)
 - b. Corolla dark chocolate 92. *C. gossweileri* (4 in.)
 - c. Corolla dusky red; plant stems "softly pubescent" 93. *C. huillensis* (4 in.)

B. Corolla ciliate:

1. Inner corona-lobes incumbent on the anthers and not (or very slightly) produced above them:
 - a. Corolla yellow spotted with purple, or all purple . . . 94. *C. caudata* (3½ in.)
2. Inner corona-lobes incumbent on the anthers at the base and then produced above them, or erect, connivent or recurved, with or without a distinct secondary horn or crest:
 - a. Corolla-lobes nearly as broad at the base as long:
 - i. Corolla purple-black 95. *C. melanantha* (2 in.)
 - b. Corolla-lobes much longer than broad:
 - i. Corolla yellow:
 - + Ratio of length to width of corolla-lobes about 4:1 96. *C. lutea* (2 in.)
 - ++ Ratio of lobes about 5:1; flowers large . . . 97. *C. vansonii* (3½ in.)
 - ii. Corolla yellow with purple-brown blotches . . . 98. *C. knobelii* (1½ in.)
 - iii. Corolla in purple or brown tones:
 - + Corolla over 3 inches in diameter:
 - ◇ Corolla brick-red 99. *C. lateritia* (3½ to 5 in.)
 - ◇◇ Corolla dark red-brown (yellow spots on variety) 100. *C. nebrownii* (4 in.)
 - ++ Corolla under 3 inches in diameter:
 - ◇ Corolla dark purple-brown (?); lobes ciliate with clavate purple hairs:
 - * Outer corona-lobes 4-toothed at apex 101. *C. vaga* (2½ in. or more)
 - ** Outer corona-lobes acute at apex, with a small tooth on each side 102. *C. valida* (2 in.)
 - ◇◇ Corolla bright chocolate, or with green or yellow tips; lobes ciliate with minute simple hairs . . . 103. *C. lugardi* (1¾ in.)
 - ◇◇◇ Corolla pale purple to deeper purple in tube; lobes minutely ciliate at base 104. *C. longicuspis* (2½ in.)
 3. Inner corona-lobes subdivided into very long filiform segments, coiled at the tips:
 - a. Corolla yellowish 105. *C. rogersii* (1½ in.)

1. *Caralluma edulis* (Edgeworth) Bentham et Hooker fil., Genera Plant., ii. 782. 1876.

Boucerosia edulis Edgeworth, Journ. Linn. Soc., vi. 205. 1862.

Boucerosia stocksiana Boissier, Flora Orient., iv. 64. 1879.

(Description based on that by M. P. Edgeworth, l.c., translated from the Latin):

Stems: erect, succulent, subterete, 4-angled; leaves opposite, wedge-shaped or elliptical, perishable;

Flowers: 2 together, from the axils of the leaves;

Pedicel: slender, subpendulous, then erect, with 2 minute subulate bracts;

Sepals: acute with pellucid margins;

Corolla: glabrous on both sides, veined, with purple streaks at the base; *tube* swollen, hemispherical; *lobes* subulate, attenuate, reflexed;

Outer corona: lobes with 2 scythe-shaped subulate segments, hollowed on inner face, purplish, nectar-bearing;

Inner corona: lobes longer than the outer corona-lobes, strap-shaped, incumbent on the anthers.

Type locality: India: Punjab: without precise locality.

Distribution: Also from Sind: near Karachi; and Baluchistan.

The "edible *Caralluma*" was discovered in the Punjab by Michael Pakenham Edgeworth, probably prior to 1860. It grows also in Baluchistan and Sind. The 6 to 18 inch stems are almost cylindric, so rounded are the angles, and they taper gradually to a pointed tip. The rudimentary leaves appear to be unusually prominent, up to half an inch long and semi-persistent. The stems are slightly acid, but they are sold as a vegetable in the local bazaars under the name of *Situn*. The glabrous flowers are about $\frac{1}{3}$ inch in diameter, seemingly far more bell-shaped than any of the other Indian *Carallumas*, with the corolla-tube swollen at the middle and with narrow pointed reflexed lobes. Near the centre the surface is marked by longitudinal purple streaks. The outer corona divides into five deeply cleft lobes, each with two long filamentous arching-divergent teeth, and from between these the very long inner corona-lobes project inwards, adnate at the base to the outer corona and incumbent at the tips over the anthers.



FIG. 123

Caralluma edulis Bentham et Hooker fil. x 0.5
Drawing by Edgeworth in Journ. Linn. Soc., 1862.

2. *Caralluma stalagmifera* C. E. C. Fischer, Kew Bull., 430. 1925.

(Description based on that by Mr. Fischer, l.c., translated from the Latin):

Stems: 5 to 8 mm. thick, glabrous, 4-angled, with slender branchlets indistinctly angled; angles with occasional flower-bearing tubercles, devoid of leaves;

Flowers: few, solitary;

Bracts: at the base of the pedicels, minute, triangular-subulate;

Pedicel: slender, about 5 mm. long;

Sepals: $1\frac{1}{2}$ to 2 mm. long, fleshy, triangular-acuminate;

Corolla: broadly campanulate, about 1 cm. in diameter, fleshy; *tube* short, green at the bottom; *lobes* ovate-lanceolate, greenish outside, blackish-purple inside, tipped with a thick whitish mucro, fringed near the apex with 2 or more minute awn-like purple stalagmite-shaped hairs;

Corona: annular, dark purple, forming a single series (as the outer and inner corona-lobes alternate—W. & S.);

Outer corona: lobes formed of 2 erect linear-lanceolate slightly curved segments;

Inner corona: lobes (arising from between the outer corona-lobes at their base and then) incumbent over the anthers, formed of three segments, the middle one rounded, the lateral ones narrow.

Type locality: India: Madras Presidency: Chingleput Distr.: Vandalur.

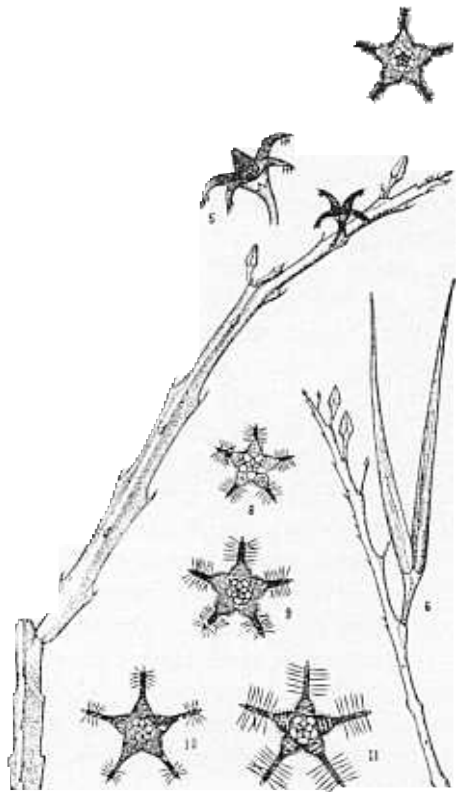
Distribution: Recorded from Vizagapatam, Godavari, Anantapur, Cuddapah, Bellary, Kurnool, Nellore, Chittoor, Chingleput, Ramnad and Madura Districts; and Mysore and Pudukkottai States.

The "stalagmite-bearing *Caralluma*" was discovered about 1925 by P. V. Mayuranathan at Vandalur, near Madras. Dr. Gravely and Mr. Mayuranathan have given a very interesting account of the species, in their Bulletin on the Indian Species of *Caralluma*, p. 16, saying in part: "Though less widely distributed than *C. adscendens*,

FIG. 124

From Gravely and Mayuranathan: Indian Species of *Caralluma*, 1931.

4. *Caralluma stalagmifera* with flower x 0.5
5. *Caralluma stalagmifera* flower x 1.
6. *Caralluma stalagmifera* with seed pod.
7. *Caralluma adscendens* var. *geniculata* flower x 1.
8. *Caralluma adscendens* var. *gracilis* flower x 1.
9. *Caralluma adscendens* var. *attenuata* rotate type of flower x 1.
10. *Caralluma adscendens* var. *attenuata* dark rotate variety of flower x 1.
11. *Caralluma adscendens* var. *carinata* rotate and dark colored type of flower x 1.



C. stalagmifera seems to be quite as widely distributed as var. *attenuata* of that species and much more so than any other of its varieties. *C. stalagmifera* occurs with *C. adscendens* var. *attenuata* over the greater part of its range, but does not seem to extend so far west, though extending north into the area between the limits of the known ranges of that variety and the type, and south into the area occupied by the *carinata* group. . . . The color of the inner surface of the corolla-lobes may be either brown as it was, for instance, in the type specimens from Vandalur, or dark purple as it always seems to be in specimens from Guindy (Chingleput distr.). In some localities, such as Pudukkottai and Vizagapatam, the two forms occur together. Sometimes they are spotted with the same color outside. In only a single specimen from Simhachalam (Vizagapatam distr.) is there any trace of a pale transversely striated area at the base of the corolla-lobes—a specimen which has the hairs confined to the tips of the corolla-lobes. . . . The stalagmite-like hairs from which the species takes its name may be confined to a very few at the tips of the corolla-lobes or may form a heavy fringe along the sides of the lobes as they do in specimens found together with typical ones at Siddhout (Cuddapah distr.) and in specimens from the Tirupati Hills (Chittoor distr.), or there

may be hairs of this type in the distal parts of the lobes and filamentous hairs in the basal parts as in specimens from Kanadukathan (Ramnad distr.). The stems have their angles rounded and are usually more or less streaked with a dull reddish color—more so even than in *C. adscendens* var. *attenuata*. This species probably hybridizes occasionally with *C. adscendens* var. *gracilis* and possibly indirectly with var. *attenuata*."

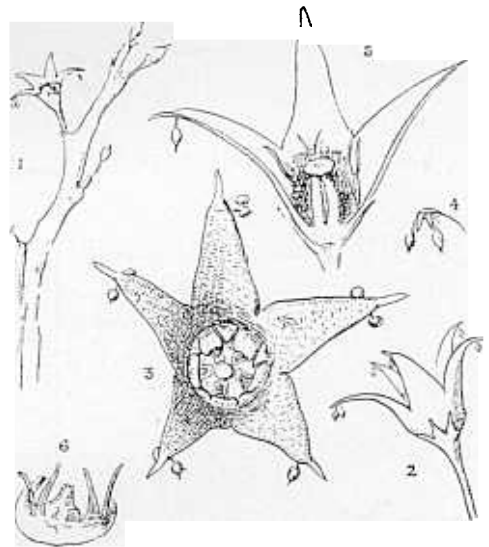


FIG. 125

Caralluma stalagmifera C. E. C. Fischer

1. Flowering stem x 1. From Kew Bulletin, 1925.

3. *Caralluma adscendens* (Roxburgh) R. Brown, Mem. Wern. Soc., i. 14. 1811.

Stapelia adscendens Roxburgh, Pl. Coast of Corom., i. t. 30. 1795.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, Ind. Sp. Gen. Car., 12. 1931):

Stems: often with reddish streaks, not to any great extent attenuate, the angles rounded except sometimes in the Attapadi Valley, South Malabar, where they tend to be more acute; leaf-scars raised on more or less distinct and outwardly directed tubercles, especially when well matured;

Flowers: more or less pendulous, hairless;

Corolla: finely spotted with purple on pale base of inner side except in the specimens from the Nagamalai Hills near Madura, where they are transversely striped as in the hairy varieties.

Type locality: India: "Coast of Coromandel," without precise locality.

Distribution: Madras Presidency: Ganjam, Godavari, Madura, Salem and Vizagapatam Districts; South Malabar; Mysore State.

Caralluma adscendens and varieties.

Caralluma adscendens x 0.5

Caralluma adscendens var. *fimbriata*
x 0.5

Caralluma adscendens var. *attenuata*
x 0.5

Caralluma adscendens var. *attenuata*
corona x 2.

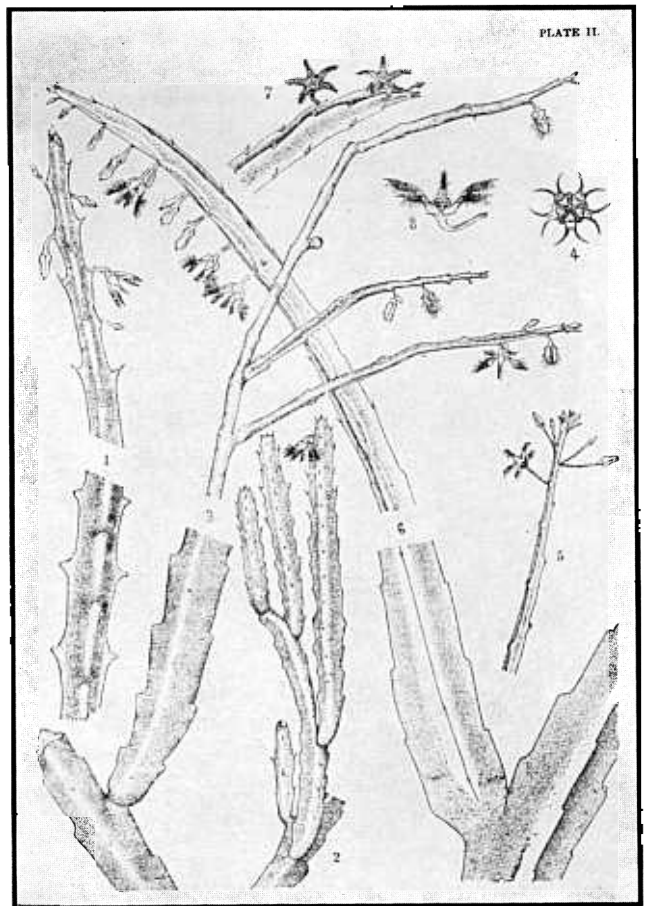
Caralluma adscendens var. *gracilis*
x 0.5

Caralluma adscendens var. *carinata*
x 0.5

Caralluma adscendens var. *geniculata*
x 0.5

Caralluma adscendens var. *geniculata*
with pedicel x 1.

From Gravely and Mayuranathan: Ind
Sp. Caralluma, 1931.



Var. a. *Caralluma adscendens* var. *fimbriata* (Wallich) Gravely et Mayuranathan, Ind. Sp. Gen. Car., 13. 1931.

Caralluma fimbriata Wallich, Pl. As. Rar., i. 7. 1830.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, l.c.):

Stems: small, not definitely attenuate, sometimes reddish distally, their angles rounded;

Flowers: rather small, more or less pendulous, hairy; the Indian specimens have flowers of a chestnut-brown color and are slightly larger than those of the Ceylon specimens, though smaller than those of the var. *attenuata*; the Ceylon specimens have purple flowers very like those of the var. *attenuata* in color, but much smaller.

Type locality: Burma: on mounds along the Irrawaddy near Yenangeun.

Distribution: Also in Burma: from the ruins of Pagamew; Ceylon: Ooma Oya, on the lower road from Kandy to Badulla; India: Madras Presidency: Chingleput District; Bombay Presidency: Satara District.

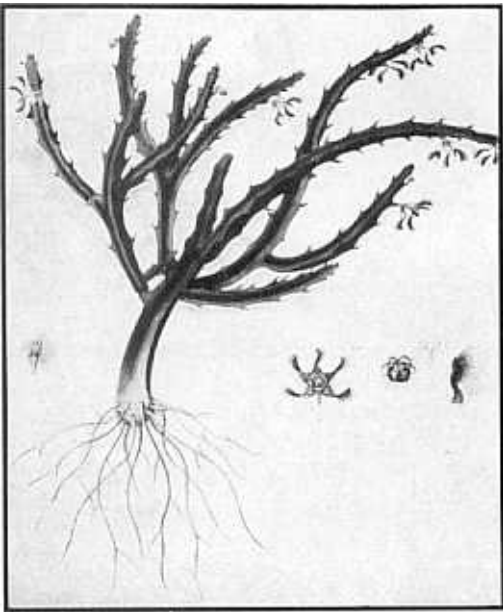


FIG. 127

Caralluma adscendens var. *fimbriata*

Gravely et Mayuranathan x 0.5

From Wallich: Pl. As. Rar., 1830.

Var. b. *Caralluma adscendens* var. *attenuata* (Wight) Gravely et Mayuranathan, Ind. Sp. Gen. Car., 13. 1931.

Caralluma attenuata Wight, Icon. Pl. Ind. Orient., iv. t. 1268. 1850.

Caralluma fimbriata Hooker fil., Flor. Br. Ind., iv. 77. 1885. *Nec* Wallich, 1830.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, l.c.):

Stems: except when young and undergoing rapid growth, strongly attenuate and usually much branched distally, usually with reddish streaks, their angles always rounded; total height often well over 2 ft., of which only the lower part (less than half this height) is stout;

Flowers: hairy, less definitely pendulous than in the type and var. *fimbriata* and often opening more widely when they are about 15 mm. across, their markings usually dark purple in color.

Type locality: India; at the foot of the Nilgiris.

Distribution: Widely distributed in Bellary; Kurnool; Cuddapah; Anantapur; Nellore; Chittoor; North Arcot; Chingleput; Salem; Coimbatore; Madura Districts; Palghat taluk; Pudukkottai State; and Mysore State.

Var. c. *Caralluma adscendens* var. *gracilis* Gravely et Mayuranathan, Ind. Sp. Gen. Car., 14. 1931.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, l.c.):

Plant: with a maximum height of at least 2 ft., of which the last foot or more is extremely slender; angles of stems acute; *stems* green, as much as $\frac{3}{4}$ in. square near base, distally strongly attenuate, very slender and much branched;

Flowers: hairy, widely opened, very small (only about 10 mm. across), erect, borne in pairs on long slender pedicels, their dark markings chestnut-brown in color, the pale expanded portion of the *corolla-lobes* larger in proportion to the dark folded portion than in any of the other varieties, and ordinarily with only very faint markings.

Type locality: India: Pudukkottai State; Pudukkottai Town forest.

Distribution: Recorded from numerous stations in Pudukkottai State; Ramnad; Salem; Coimbatore; and Tinnevely Districts.

Var. d. *Caralluma adscendens* var. *carinata* Gravely et Mayuranathan, Ind. Sp. Gen. Car., 16. 1931.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, l.c.):

Plant: with a maximum height over 2 feet; angles of stems acute; *stems* green, distally gradually attenuate in varying degree but never as strongly as in the vars. *attenuata* and *gracilis*, usually unbranched unless the tip is broken and even then with not more than one or two branches, rarely much branched as in var. *attenuata*;

Flowers: purplish, hairy, usually pendulous and campanulate but sometimes semi-erect and rotate;

*Pedice*l: not bent at an angle.

Type locality: India: Madura District: on the Nagamalai Hills.

Distribution: Also from the Alagar Hills, in the same District.

Var. e. *Caralluma adscendens* var. *geniculata* Gravely et Mayuranathan, Ind. Sp. Gen. Car., 16. 1931.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, l.c.):

Stems: green, usually very slightly attenuate and unbranched distally, sometimes, however, producing a distinctly secondary growth which is very slender and occasionally much branched; angles of stems acute;

Flowers: hairy but less conspicuously so than in the other hairy varieties, widely opened, about 15 mm. across, facing upwards, their dark markings chestnut-brown;

*Pedice*l: almost always bent at an angle just below the flower except when, as occasionally happens, it is too short to be bent at all and on slender secondary growths when it seems normally to be erect.

Type locality: India: Tinnevely District: lower slopes of the Kalakad Hills.

Distribution: Also from South Travancore.

In their admirable Bulletin on the Indian Species of the Genus *Caralluma*, Dr. Gravely and Mr. Mayuranathan have given a most exhaustive analysis of the "ascending *Caralluma*", which must be studied directly by anyone wishing to obtain a

comprehensive idea of this very intricate and variable species. The authors have combined into this one species and its five varieties all the forms of *Eucaralluma* native to the Peninsula of British India except one, *Caralluma stalagmifera*, in

which the spindle-shaped hairs fringing the corolla-lobes are so distinctive as to determine beyond a doubt its status as a separate species. The Peninsula species, *C. adscendens* and *C. stalagmifera*, are very different from Edgeworth's species, *C. edulis*, from northwestern India. Their stems have smaller and probably less persistent leaves. The corolla of their flowers is not marked at the centre with the striation characteristic of *C. edulis* and the lobes terminate in hard spine-line processes at the apex. The outer corona-lobes are fused to form plates, from the end of each of which arises a pair of long terminal filaments, almost in contact with one another at the base.

"In this variable and widely distributed species," write Dr. Gravelly and Mr. Mayuranathan, "at least six distinct forms have been recognized. The characters by which they are separated are found partly in the flower and partly in the stem. In the type and the two varieties *attenuata* and *fimbriata* (that have long been known and have hitherto been regarded as distinct species) the stem is squarish in section with the sides usually slightly hollowed and the angles always rounded, never acute as they are represented in Roxburgh's figure of the type (Fig. 128) and Wight's figure of var. *attenuata* (Fig. 129); and we have been unable to find any acute-angled forms north of a line from the State of Pudukkottai to Neringipet in the Coimbatore District. That the artists who prepared the original figures of them should have thus intensified the marked angularity of their stems is very natural; but it is a most unfortunate mistake in view of the discovery, during the preparation of this paper, of a group of varieties apparently confined to the extreme south of the Indian Peninsula, which is distinguished from them by this very character. This group with acute-angled stems has been found in the dis-

tricts of Pudukkottai, Ramnad, Coimbatore, Madura and Tinnevely, the first three and each of the two last of which has its own characteristic variety, making three varieties in all.

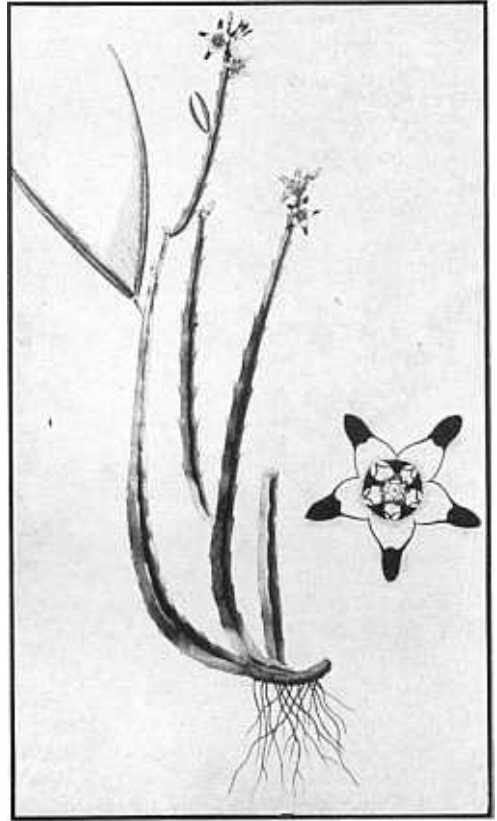


FIG. 128

Caralluma adscendens R. Brown x 0.5

From Roxburgh: Plants of the Coast of Coromandel, 1795.

"The stems (apart from their acute angles) but not the flowers of the first variety (*gracilis*), and the flowers but not as a rule the stems of the second variety (*carinata*), are not unlike those of var. *attenuata*. The flowers of the first (*gracilis*) and third (*geniculata*) varieties resemble each other more closely than they do those of *C. stalagmifera* or *C. adscendens* vars. *attenuata* and *fimbriata*. It is therefore impossible to suggest any cross that would

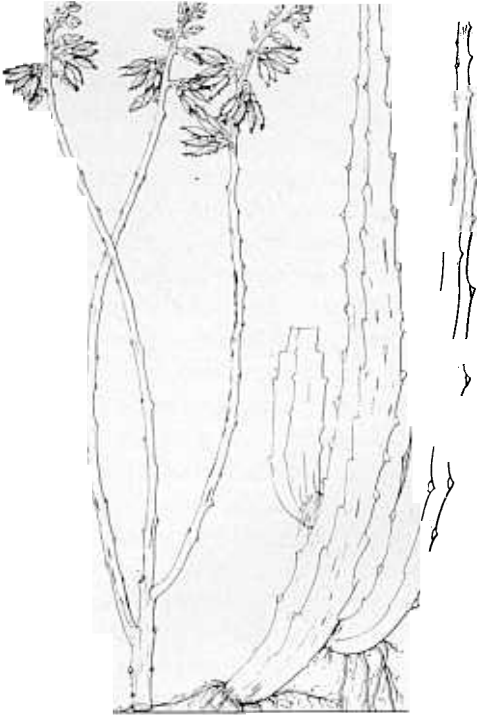


FIG. 129

Caralluma adscendens var. *attenuata*
Gravely et Mayuranathan x 0.5.

Drawing by Gorindoo, from Wight: *Icones*
Plant. Ind. Orient., 1850.

seem likely to produce any of these acute-angled varieties. That they are not hybrids is further indicated by the results we have obtained on raising the second variety (*carinata*) from seed. Seed from a pod collected in the Alagar Hills was sown in Madras. Several plants grew large enough to flower and all came absolutely true to type. Later another plant was raised from seed, apparently self-sown, in Madras. This, too, came absolutely true to type. It seems most unlikely that these plants would not have shown considerable variation had they come of hybrid stock.

"Hybridization does, however, appear to take place between var. *attenuata* and the only acute-angled variety (*gracilis*) that grows with or near it (Fig. 141: 5-6), and possibly also between the latter variety and *C. stalagmifera*, which likewise occurs with it (Fig. 141: 1-4). Such hybrids have only been found in the localities inhabited by their parents.

"*Caralluma adscendens* and its varieties may be defined as follows:

1. Flowers hairless; leaf scars (particularly on old stems) on blunt, rather prominent, outwardly directed protuberances. *C. adscendens*
Flowers hairy; protuberances less distinct, directed more upwards. 2
2. Angles of stem, at least towards base, rounded. 3
Angles of stem, at least towards base, acute. 4
3. Stems small and of about equal thickness throughout. var. *fimbriata*
Stems larger, more or less strongly attenuate distally. var. *attenuata*¹
4. Flowers small, on long erect slender pedicels, stems distally very slender, often branched. var. *gracilis*²
Flowers larger, pendulous or erect, stems distally as a rule unbranched and much less slender. 5
5. Flowers usually more or less distinctly pendulous, rarely suberect, their pedicels never bent at an angle, hairs strongly developed; stems more or less distinctly attenuate, occasionally much branched. var. *carinata*
Flowers brought to face upwards by means of a somewhat abrupt bend in their pedicels; hairs not strongly developed; stems not markedly attenuate, never branched³. var. *geniculata*

1. Or the presumed hybrid between var. *attenuata* and var. *gracilis*.

2. Or one of its two presumed hybrids.

3. Except when well marked secondary growth has taken place. Such growths, which may be found terminating certain branches of otherwise normal plants, are abruptly attenuated from their base, and their flowers lack the characteristic bend in the pedicel.

"*Caralluma adscendens* with its varieties probably occurs in suitable situations all over the Indian Peninsula south and inclusive of Poona in the west and Ganjam in the east. It also occurs in Ceylon and Burma. The type and var. *fimbriata* differ from all other varieties in that their geographical range is very wide and markedly discontinuous, and in combining two obviously ancestral characters—rounded angles and not markedly attenuate distal region—in the stem. These features lead us to regard these two as the oldest forms of the species; and of them we regard *fimbriata* as the oldest of all since it is the only form of *Eucaralluma* found in the outlying countries of Burma and Ceylon. The characters both of the stems and of the flowers tend to confirm this conclusion. Its flowers resemble those of *attenuata*, the dominant variety of the Indian Peninsula, which has presumably been derived either from it or from some closely allied form ancestral to them both by the development of attenuate terminations to the stems, whereas the type has been derived by the loss of hair from the flowers and by less marked changes in the stems. *Attenuata* has established itself in suitable localities, roughly from the Kistna basin in the north to Coimbatore and Pudukkottai in the south, but has not entirely ousted *fimbriata*, which occurs in several places within this area—apparently, however, on its borders only, both western and eastern. The type has established itself north of the Godavari, where it is the only form of the species found. That it once had a much wider range is indicated by the fact that it is also abundant near Agali in the dry region of the Attapadi Valley, South Malabar, where no other form of *Eucaralluma* seems to have established itself, that a few plants have been found associated with the locally more abundant var. *carinata* and *C. stalagmifera* on the Nagamalai Hills near Madura, and that it occurs at Nanjangud,

Mysore State, in association with var. *attenuata* and *C. stalagmifera*.

"The acute-angled varieties, which together occupy the far south of the Indian Peninsula, have presumably been derived either direct from the ancestral var. *fimbriata* or from var. *attenuata*. Apart from its acute angles, var. *gracilis* closely resembles var. *attenuata* in general habit, while var. *geniculata* (apart from the slender secondary growth which sometimes occurs) resembles rather var. *fimbriata*, var. *carinata* being in this respect transitional between the other two, and unlike them retaining the ancestral pendulous flower.

"Var. *gracilis* is the only one of these acute-angled varieties which is commonly found living in close association with any other variety, having been found in about equal abundance with var. *attenuata* at Neringipet and near Bhavani in the Coimbatore District and at Shankaridrug in the Salem District. In Pudukkottai State the southern limit of distribution of var. *attenuata* appears to be a few miles north of the northern limit of that of var. *gracilis*. In some of these places intermediate forms occur. In Pudukkottai, where both the typical var. *gracilis* and the intermediates were first found, the latter only occur close to the northern limit of distribution of the typical var. *gracilis* (i.e., only a few miles from localities where var. *attenuata* is found) and there they are much less abundant than the typical var. *gracilis*. Near Bhavani the intermediates and the typical forms of both var. *attenuata* and var. *gracilis* were found in about equal abundance; but in Neringipet and Shankaridrug, though the typical forms of both varieties are common, no intermediates whatever seem to occur.

"The three acute-angled varieties, occupying as they do a single geographical area, must presumably have had a common origin, whether through var. *gracilis* from var. *attenuata* or direct from var. *fimbriata*.

On the latter hypothesis the intermediates between the two former varieties could only be regarded as hybrids, and their absence from Neringipet and Shankaridrug could be explained if the strains of the parent varieties in those localities happened not to be mutually fertile. On the former hypothesis the intermediates might either be hybrids between two fully differentiated varieties or they might be remnants, which had already disappeared in some places, of the stages through which var. *gracilis* passed in the course of its evolution from var. *attenuata*. At first sight the last may seem the probable explanation, especially when the close similarity between the two varieties is remembered. But when the two other acute-angled varieties are also considered it seems more doubtful, unless the loss of the bend in the pedicels on the slender secondary growths of var. *geniculata* can be taken to indicate that these growths are reversionary.

"If, however, the intermediates are hybrids they constitute the only such case of hybridization between two varieties of *C. adscendens* that we know of. In this connection we must point out that there is some independent evidence suggesting that var. *gracilis* has unusual powers of hybridization, for both in the Pudukkottai Town forests and in Tiruppattur (Ramnad District) where it is found in close association with *C. stalagmifera*, intermediates with this species have also been found which we presume must be hybrids. Yet no

apparent hybrid has been found between var. *attenuata* and *C. stalagmifera* over the whole of the immense tract of country where they occur together elsewhere.

"A glance at Fig. 141: 1-6 will show how completely not only vars. *attenuata* and *gracilis* but also *C. stalagmifera* grade into one another in Pudukkottai, where all the specimens there figured were found. This may seem to suggest that there is no true distinction between them. It must, however, be remembered that most of these transitional forms are exceptional, having been carefully selected from among the much larger numbers of others and only having been found at all in Pudukkottai. Only in the case of the vars. *attenuata* and *gracilis* are transitional forms anywhere common; and except in one locality (near Bhavani) they always seem to be less common than the typical forms, and sometimes are not to be found at all in places where both the typical forms are abundant.

"The type of *C. adscendens* and the var. *fimbriata*, especially the latter, have restricted flowering seasons. In Madras *fimbriata* flowers freely during and shortly after the heavy November rains and more sparingly on into the hot weather. The type of *C. adscendens* flowers freely in the hot weather (April-May) and sometimes sparingly at other times. The other varieties flower under suitable conditions more or less continuously throughout the year, as does *C. stalagmifera* also."

4. ***Caralluma subulata*** (Forsk.) Decaisne, Ann. Sc. Nat., ix. 267. 1838.

Stapelia subulata Forskal, Flora Aeg.-Arab., 108. 1775.

(Description by J. Decaisne, l.c., translated from the Latin) :

Corolla: lobes lanceolate, acuminate, narrowed towards the base, covered with long soft hairs;

Outer corona: lobes 3-toothed, the central tooth lanceolate.

Type locality: Southern Arabia; Yemen: "in the middle region of the mountains."

Distribution: Recorded from Bilad Fodhli; Wadi Eybad, near Schoukra; Hadramaut: without precise locality.

The "awl-shaped *Caralluma*" was collected in Yemen about 1762 by the unfortunate young Peter Forskal, and later by Deflers in Bilad Fodhli and by Lunt in Hadramaut, so that it appears to be a somewhat widely distributed species. It is the only *Eucaralluma* represented in Arabia, with typical stems, 4-angled at the

base, tapering and terete at the apex, about a foot high. The half-inch flowers hang, solitary or in small clusters, from the top of the stems. Their color is not stated. The corolla is hairy on the inside and ciliate on the lobes. The shape of the lobes, tapering to a subulate tip, has given the species its name.

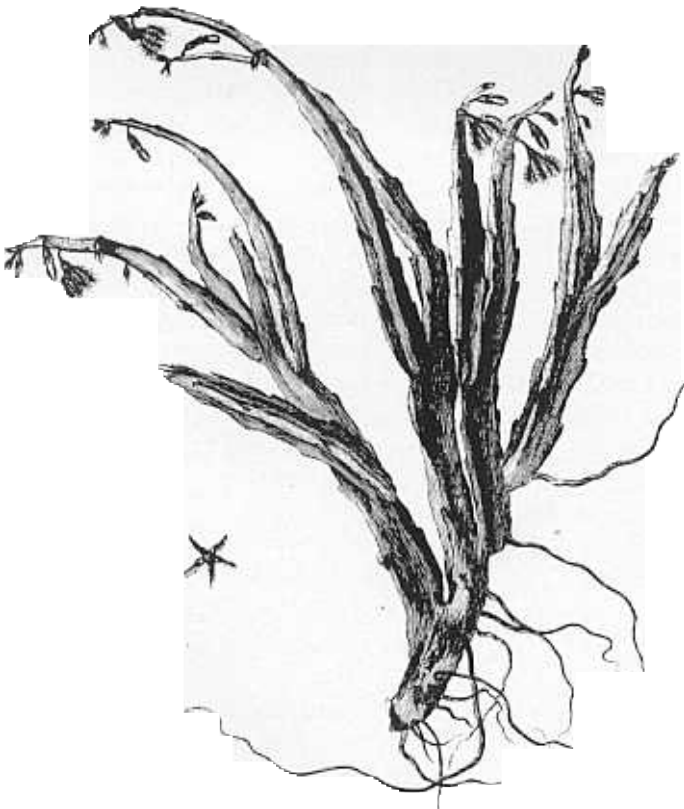


FIG. 130
Caralluma subulata Decaisne x 0.5
From Forskal: Icon. Rerum Nat.,
1776.

Fig. 131, published by Decaisne together with the description quoted at the head of the last page, does not appear satisfactory, in spite of, or perhaps because of, the greatly magnified details. There is no indication

of the ciliation of the corolla-lobes, an important character of the flowers, and the tiny middle tooth of the outer corona-lobes deserves a better description than the single word "lanceolate."

D

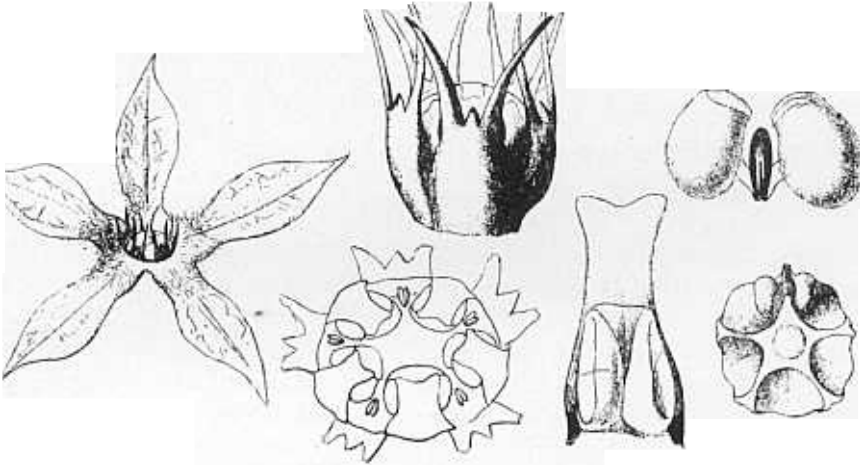


FIG. 131

Caralluma subulata Decaisne x 4.
From Annales des Sciences Naturelles, 1838

5. *Caralluma sinaica* (Decaisne) Benth. et Hook. fil., *Genera Plant.*, ii. 782. 1876.

Boucerosia sinaica Decaisne, de Candolle: *Prodromus*, viii. 649. 1844.

(Description by J. Decaisne, l.c., translated from the Latin):

Stems: elongated, slender, obsoletely angled and grooved, with hard teeth, the younger stems somewhat more terete;

Flowers: solitary from the tips of the smaller branches;

*Pedice*l: reflexed;

Corolla: small, only $1\frac{1}{2}$ lin. in diameter in the single flower seen, with subdeltoid lobes, hairy within;

Outer corona: much larger than the inner corona;

Inner corona: lobes incumbent on the anthers, ligulate, acute.

Type locality: Sinai Peninsula; without precise locality.

Distribution: Not further known.

The "Sinai *Caralluma*", from the Sinai Peninsula, was collected by Pierre Martin Rémi Aucher-Eloy between 1830 and 1838. It is very imperfectly known, but the description of the stems makes it probable that it belongs among the *Eucarallumas* and it may prove to be closely related to *C. subulata*. The only flower known is, however, only $\frac{1}{8}$ inch in diameter, so that the plant must closely rival *Echidnopsis nubica* for the distinction of having the smallest flowers of any Stapeliad.

6. *Caralluma vittata* N. E. Brown, Flora Trop. Afr., iv. i. 483. 1904.

(Description by Dr. Brown, l.c.):

Plant: apparently about 6 to 8 in. high, branching; *branches* 4-angled, glabrous, about 4 lin. thick in the dried state, much attenuated upwards; angles slightly toothed; teeth bearing minute deciduous fleshy ovate very acuminate leaves $\frac{1}{2}$ to 1 lin. long;

Flowers: solitary or 2 to 4 together, scattered along 2 to 4 in. of the very slender terminal part of the branches, erect;

*Pedice*l: 2 to 5 lin. long, glabrous;

Sepals: 1 lin. long, $\frac{2}{3}$ lin. broad, ovate, acuminate, glabrous;

Corolla: *tube* about $1\frac{1}{2}$ lin. long and $1\frac{1}{2}$ to 2 lin. broad, campanulate (or globose-campanulate?), whitish, longitudinally striped with dark purple, glabrous on both sides; *lobes* spreading (or ascending?), 2 lin. long, 1 lin. broad at the base, elongate-deltoid, acute, dark purple, glabrous, not ciliate on the reflexed margins;

Outer corona: of 10 linear-subulate teeth, $\frac{1}{2}$ to $\frac{2}{3}$ lin. long, ascending, each pair divergent-curved at the tips;

Inner corona: lobes $\frac{1}{2}$ to $\frac{2}{3}$ lin. long, subulate, incumbent on the backs of the anthers and a little longer than them;

Anthers: oblong, obtuse, unappendaged, incumbent on the truncate apex of the style.

Type locality: Sudan: Kassala Prov.: without precise locality.

Distribution: Not further recorded.

The "striped *Caralluma*," the first of the Sudan *Eucarallumas*, was discovered by Theodore Bent about 1895 and is only imperfectly known from his herbarium material. The glabrous $\frac{1}{2}$ -inch flowers are whitish, with dark purple longitudinal stripes on the inner face of the corolla-tube, the lobes dark purple. The outer corona is composed of 10 linear teeth, each pair arching outward at the pointed tips. It is a curious coincidence in names that the Flore d'Egypte, E. Sickenberger, Cairo, 1901, lists *Stapelia vittata* as "common in gardens." At first glance it would seem that Bent's plant from the Sudan might well have been cultivated in the gardens of Cairo six years after its discovery and three years before its description by Dr. Brown; but there is no evidence that this really happened and the more likely explanation is that *Stapelia vittata* was simply another garden name at the moment for some form of good old *S. variegata*.

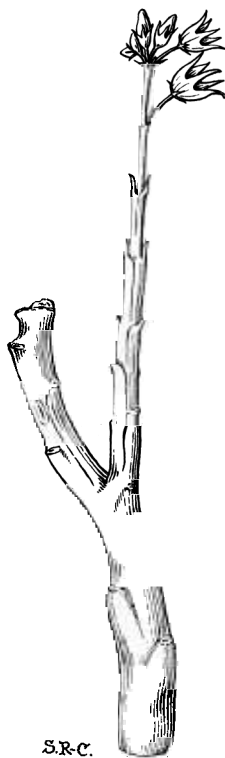


FIG. 132

Caralluma vittata N. E. Brown x 1

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

7. *Caralluma longidens* N. E. Brown, Gard. Chron., xii. 369. 1892.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 483):

Stems: erect, branching, glabrous; branches erect, 5 to 8 in. long, attenuated upwards, 4-angled; angles slightly toothed; teeth furnished with fleshy terete acuminate deciduous leaves 1 to 3 lin. long;

Flowers: solitary or occasionally 2 together, subaxillary along the upper part of the stem;

Pedicel: $\frac{1}{4}$ in. long, elongating to $\frac{1}{3}$ to $\frac{1}{2}$ in. long when in fruit, glabrous;

Sepals: 1 to $1\frac{1}{2}$ lin. long, ovate, acuminate, glabrous;

Corolla: apparently of a dark purple-brown color, entirely glabrous; *tube* 3 to 4 lin. long and about $2\frac{1}{2}$ to 3 lin. in diameter, campanulate; *lobes* $2\frac{1}{2}$ to 3 lin. long, spreading, ovate-lanceolate, acute;

Outer corona: of 10 linear-subulate teeth 2 to $2\frac{1}{3}$ lin. long, each pair with divergent-curved tips, much exceeding the staminal column;

Inner corona: of 5 linear-subulate teeth $1\frac{1}{2}$ lin. long, incurved over the top of the staminal column, with their tips closely inrolled in a circinnate manner;

Staminal column: about 2 lin. long; *anthers* incumbent on the truncate apex of the style, oblong, with a short, erect, obtuse appendage.

Type locality: Sudan: Wady Laëmeb, between Suakin and Berber.

Distribution: Not further known.



The "long-toothed *Caralluma*," which the tribesmen of the Nubian Desert call *Schöök*, is the second Sudan species of *Eucaralluma*. It was discovered by Prof. Schweinfurth, Oct. 1, 1868, between the 5th cataract of the Nile and the Red Sea. The stems are 5 to 8 inches high, contrasting with the 2 to $3\frac{1}{2}$ -foot stems of the Indian *Caralluma adscendens*. The $\frac{3}{4}$ -inch flowers are entirely glabrous, probably purple-brown. The species gets its name from the 10 very long teeth which compose the outer corona. The inner corona-lobes are incurved over the staminal column, with their tips curiously rolled into a little coil.

FIG. 132-A

Caralluma longidens N. E. Brown

From a photograph of the type specimen in the Herbarium of the Berlin-Dahlem Botanic Museum.

8. *Caralluma mouretii* Chevalier, Rev. Bot. Appl., 270. 1934.

Caralluma edulis Chevalier, Expl. Afr. Occ. Franc., i. 440. 1920. *Nec* Bentham et Hooker fil., 1876.

(Description by Prof. A. Chevalier, Rev. Bot. App., l.c., translated from the French):

Stems: rooting at the base, then erect and much branched, 20 to 30 cm. high, subcylindric, hardly 4-angled, slender, 2 to 3 mm. thick, glabrous, without teeth along the angles; young shoots tapering, producing at the tips some small fleshy transient linear-subulate leaves 3 to 5 mm. long;

Flowers: scattered along the terminal shoots, solitary or 2 together at the axils of certain leaves;

Pedice: slender, curved, glabrous, 4 to 6 mm. long at anthesis;

Sepals: glabrous, ovate-lanceolate, acute, 3 to 4 mm. long, free to the base;

Corolla: campanulate-urceolate, 10 to 12 mm. long, wholly glabrous; *tube* swollen, 7 to 8 mm. long and equally broad, yellowish-green, with about 20 raised longitudinal ridges on the inner surface; upper part of disk and lobes blackish-purple; *lobes* 5 mm. long, 2½ mm. broad at the base, erect, oblong-triangular, subobtusate or subacute, smooth within, rugose outside;

Staminal column: 3 mm. high, 4 mm. in diameter, surmounted by the outer corona;

Outer corona: of 10 filiform lobes, near together in pairs and not divergent, bent inwards at the upper part, 5 mm. long and far surpassing the staminal column;

Inner corona: lobes filiform, 3 mm. long, with the tips coiled into a spiral above the staminal column.

Type locality: Mauretania: Tidjikja: Nouaguelmich.

Distribution: Also from Rio de Oro; and (doubtfully) from Morocco: on the road between Tiznit and Smara, near Seguiet el Hamra.

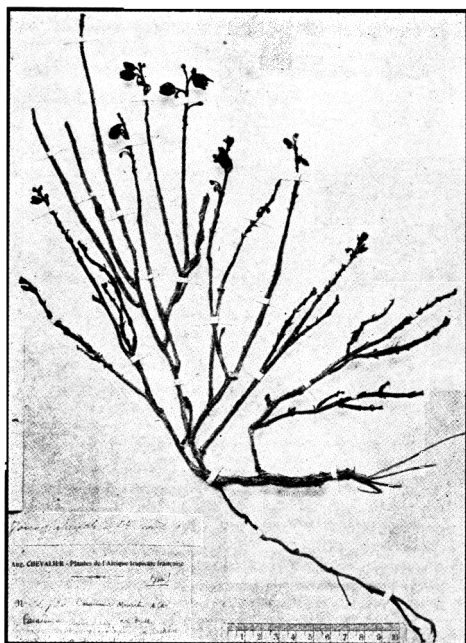


FIG. 133

Caralluma mouretii Chevalier

From Herbarium sheet of Prof. Chevalier, in Revue de Bot. Appl., 1934.

"Mouret's *Caralluma*," from the northern part of Mauretania in the Western Sahara, is closely related to the Nubian *Caralluma longidens*. It differs in having taller stems, which appear almost cylindric, as the angles are quite obsolete. The flowers have a swollen corolla-tube, greenish-yellow within and ridges with about 20 prominent lines, running lengthwise. The lobes are shorter than the tube, blackish-purple. The corona recalls that of *C. longidens*, for the outer corona far exceeds the top of the staminal column and the inner corona-lobes are circinnate at the tips; but there is a marked difference in the outer corona, in that the pairs of long filiform teeth, which form the lobes, are parallel and not diverging. It was first collected by Marcel Charles in the district of Tidjikja, Mauretania, on August 24, 1911, growing near trees and between clumps of *Panic* grass. The natives call the plant *Abouaila* or *Abila*, a name also probably attributed to the poisonous species, *Caralluma decaisneana*. *C. mouretii*, however, is eaten by the no-

mads. Hence Prof. Chevalier first named it *C. edulis* (the "edible *Caralluma*"), and when the name was found to have been used already for one of the Indian *Carallumas* he rechristened it *C. mouretii*, in memory of Lieut.-Col. Mouret, former Commissaire of the general government of French West Africa. Mouret was especially interested in botany and when, in 1912,

he conducted a raid in northern Mauretania, occupying the casbah of Smara, he had a collection made of all the native flora encountered on the expedition, his specimens being the first known from this section. Col. Mouret was killed in action in France during the opening weeks of the World War, August 25, 1914, at Tinvaux, Meurthe-et-Moselle.

9. *Caralluma mogadoxensis* Chiovenda, Flora Somala II, 299. 1932.

(Description based on that by Prof. E. Chiovenda, l.c., translated from the Latin) :

Stems: caespitose, glabrous; flowering stems 20 to 55 cm. long, 4-angled, consisting of a perennial basal section and a distinct floriferous upper section; basal section 5 to 10 cm. long, sides 5.8 mm. broad in the dry state, angles acute, teeth fleshy, subulate-conical, 2 to 3 mm. long, acute, directed upwards and nearly appressed against the stems, 3 to 5 mm. apart; floriferous section long-subulate, 17 to 36 cm. long, gradually becoming subulate-attenuate, teeth subulate, 1 to 1.5 mm. long and further and further apart near the apex;

Flowers: 1 or 2 from the axils above each of the upper teeth, forming a loose raceme up to 10 cm. long;

Pedicel: 7 to 15 mm. long, filiform, somewhat rigid, glabrous;

Sepals: ovate-lanceolate, 2 mm. long, 0.75 mm. wide at the base, acute;

Corolla: in bud 2.5 cm. long, when dry 3 mm. wide, straight or often a little curved, ovate at the base, gradually tapering but somewhat obtuse at the apex; when expanded spreading, with a very short tube hardly 1 to 2 mm. long, and linear abruptly spreading lobes 25 mm. long and 1.5 mm. broad, very acute, strongly reflexed; outside uniformly dark purple; inside beautifully marked with transverse bands or alternate white and dark purple spots; ciliate with very slender simple hairs 1.5 mm. long;

Outer corona: very short, with 5 short obtuse elliptical lobes;

Inner corona: lobes linear, spatulate, shortly bifid at the apex, glabrous;

Staminal column: hemispherical, hardly as high as, or shorter than, the corolla-tube;

Follicles: linear, 11 to 13 cm. long, 5 to 6 mm. thick, long-acuminate, smooth and glabrous.

Type locality: Italian Somaliland:

Cisgiuba district: near Mogadoxo.

Distribution: Not further known.

The "Mogadoxo *Caralluma*" was discovered in 1929 by Dr. Lorenzo Senni, near the city of Mogadoxo, the capital of Italian Somaliland. It is a beautiful species, of the *Eucaralluma* type, with long tapering stems, up to 2 feet tall, bearing near the apex loose racemes of graceful deeply-lobed flowers, two inches in diameter, spotted and banded in white and deep purple, and ciliate except at the base with slender simple hairs.

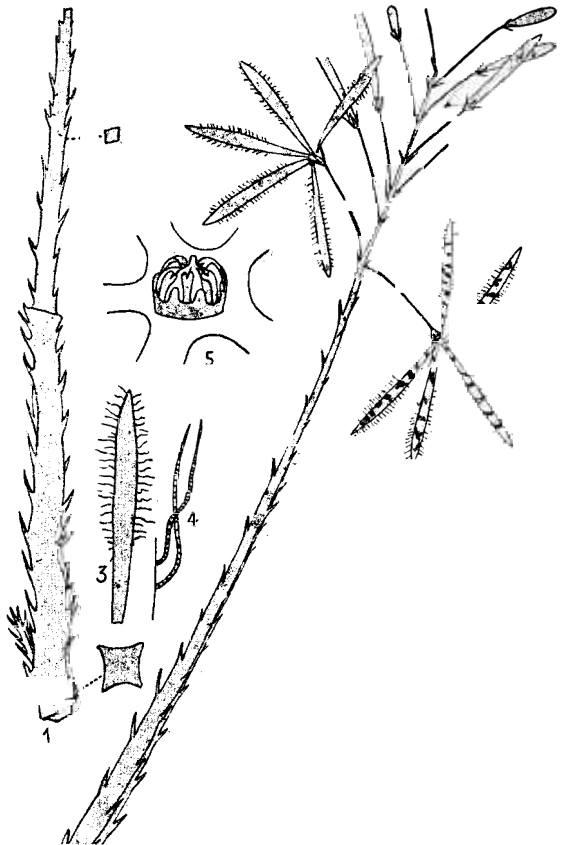


FIG. 134

Caralluma mogadoxensis Chiovenda

From E. Chiovenda: Flora Somala II, 1932.

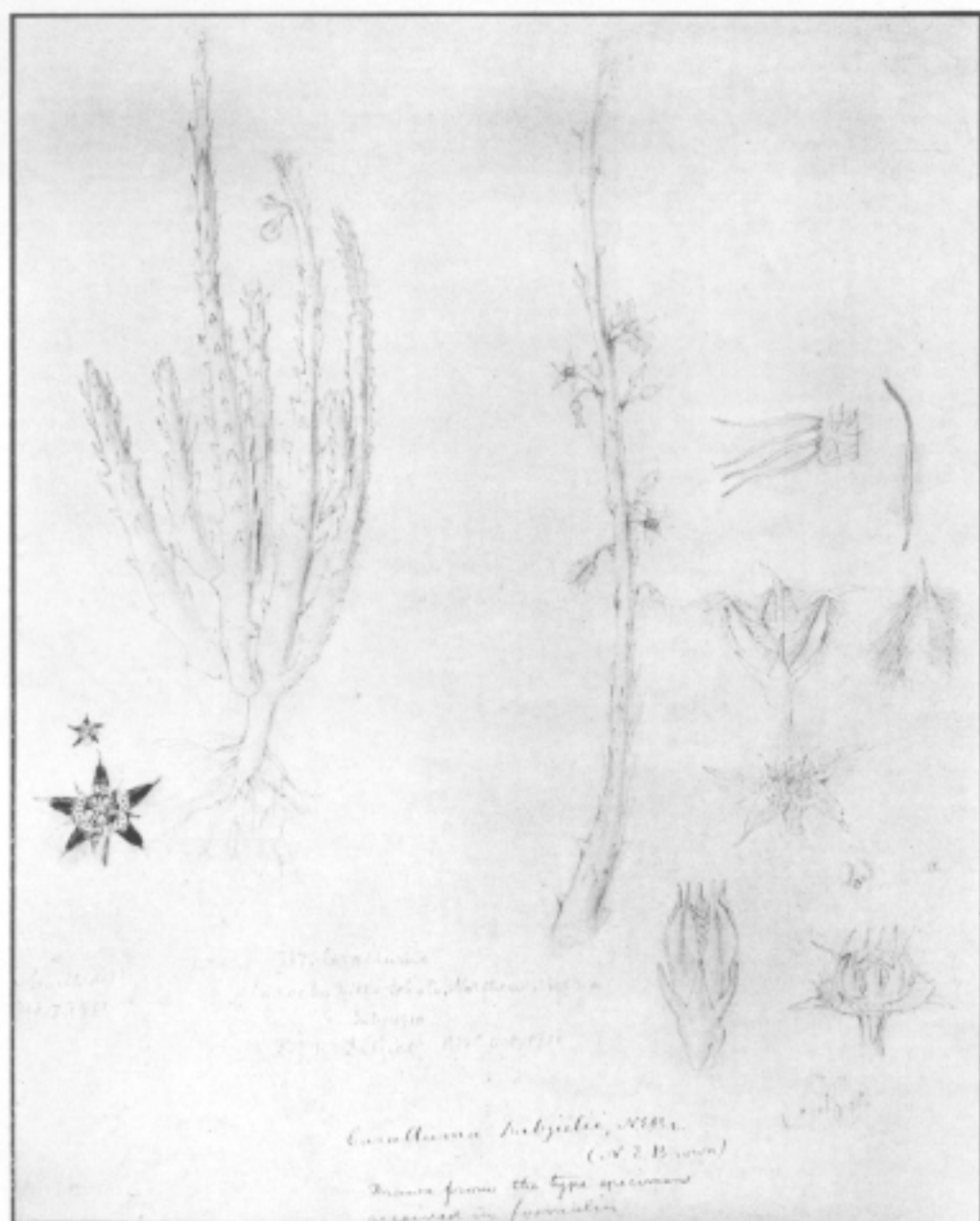


FIG. 135

Caralluma dalzielii N. E. Brown

Flower at left x 1.5

Drawing by M. Smith from the type specimen, 1911. Reproduced by permission of the Bentham Trustees.

10. *Caralluma dalzielii* N. E. Brown, Kew Bull., 280. 1912.

(Description by Dr. Brown, l.c., translated from the Latin):

Plant: a succulent herb, 15 to 28 cm. high, branching from the base; *stems* erect, 4-angled, 8 mm. thick at the base, thence gradually tapering up to the apex, glabrous, with the angles toothed; teeth ending in rudimentary subulate leaves, 3 to 4 mm. long;

Flowers: in fascicles, pendulous; fascicles axillar, 2 to 3-flowered, scattered along the upper part of the stems;

Pedicel: 2 to 3 mm. long, recurved, glabrous;

Sepals: 2 mm. long, subulate, acute, glabrous;

Corolla: 1 cm. in diameter; *tube* 1.5 mm. long, cup-shaped, glabrous; *lobes* spreading, 4.5 to 5 mm. long, 1.5 mm. broad, lanceolate, subulate-acuminate, replicate, outside glabrous, inside sparsely pubescent with very fine hairs, densely ciliate above the middle with long fusiform dark purple hairs, whitish (or yellowish?) at the base with purple spots, wholly dark purple on the upper part;

Outer corona: lobes 1 to 1.3 mm. long, erect, deeply bifid, with the segments subparallel, subulate, dark purple, glabrous;

Inner corona: lobes 0.6 mm. long, incumbent on the anthers, deltoid-oblong, obtuse, glabrous, dark purple.

Type locality: Northern Nigeria: Katagum district: rocky hills at Sokoto, sometimes planted near houses.

Distribution: Also from Upper Dahomey: Djougou, in cultivation; ? French Sudan: cliffs of Bandiagara: between Tanga and Somé; ? Middle Niger: near Lake Débo.

"Dalziel's *Caralluma*" was collected in 1910 by Prof. A. Chevalier, who found it in cultivation at Djougou, Upper Dahomey. It had been planted by natives in the corner of their yam fields as a fetish to prevent passers-by from casting a hoodoo over the fields and compromising the crop. It was described in 1912 by Dr. N. E. Brown from material collected by Dr. J. M. Dalziel in northern Nigeria, where he had found it growing wild as well as in cultivation. Dr. Dalziel, late of the West African medical service, is Assistant for West Africa at the Royal Botanic Gardens, Kew, and co-author with Dr. J. Hutchinson of the *Flora of West Tropical Africa*, 1931.



FIG. 136

Caralluma dalzielii N. E. Brown.

D. Flower x 3.5

From a drawing by W. E. Trevithick, in Dalziel and Hutchinson: *Flora of West. Trop. Afr.*, 1931.

The native name of *Caralluma dalzielii* in Dahomey (pila-pila language) is *Nenoch*, and in Nigeria it is called *Karan Masallachi*. Dr. Brown compares the plant to *C. adscendens*, stating that it differs in having flowers only half the size with a fringe of long hairs on the corolla-lobes. It is the most distant outlier of the *Eucarallumas*, 2,500 miles from the habitat of *C. vittata* and 5,000 miles from that of *C. adscendens*. Prof. Chevalier describes the stems as up to a foot high, tapering to the apex, cylindric or feebly 4-angled at the

base. The flowers are pendulous, the corolla under a half-inch diameter, whitish within with purple zebra lines and spots, the upper part of the lobes dark purple with replicate margins and ciliate with long dark purple hairs, the apex formed of a yellowish point a half-line long. The outer corona is composed of deeply-cleft lobes, of which the filiform segments vary from being almost parallel to being divergent to nearly 180 degrees. The inner corona-lobes are oblong, with their tips appressed to the top of the staminal column.

11. *Caralluma dicapuae* (Chiovenda) Chiovenda, comb. nov.

Caralluma quadrangula Di Capua, Pirotta: Flora Col. Eritr., 218. 1904. Nec N. E. Brown, 1892.
Spathulopetalum dicapuae Chiovenda, Ann. di Bot., x. 392. 1912.

(Description based on that by Prof. E. Chiovenda, l.c., translated from the Latin):

Stems: 3 to 4-angled, glabrous, with acute angles and conical rather obtuse compressed teeth, 5 to 8 mm. long, broadened at the base and 2 to 3 cm. apart; sides of stems 7 to 10 mm. wide, in the dry state ashen green; upper portion of stems gradually produced into a very long slender cylindrical stalk-like section, up to 60 cm. long and 2 to 3 mm. thick at the base in the dry state; the stalk-like portion dropping away at a transverse joint after efflorescence, leaving the apex of the remaining part of the stem truncate;

Flowers: mostly fascicled, rarely solitary, at the upper part of the stalks, forming a loose raceme 10 to 20 cm. long;

Bracts: subulate, 2 to 3 mm. long, 0.5 mm. broad, glabrous;

Pedice: slender, glabrous, 12 to 16 mm. long;

Sepals: glabrous, linear-subulate, very acute;

Corolla: in bud valvate, clavate-cylindric, long-attenuate at the basal part, abruptly apiculate at the apex, 8 to 10 mm. long, 2 to 3 mm. thick, with the apiculus 0.7 to 1 mm. long; when expanded tube hardly 0.5 mm. long, lobes first spreading, then reflexed-pendulous, linear-spatulate, long-attenuate at the basal part, abruptly apiculate at the apex, 11 to 14 mm. long, 1 mm. wide at the base and 3 mm. wide near the apex; outside glabrous, dark purple, inside densely hairy with spreading clavate hairs;

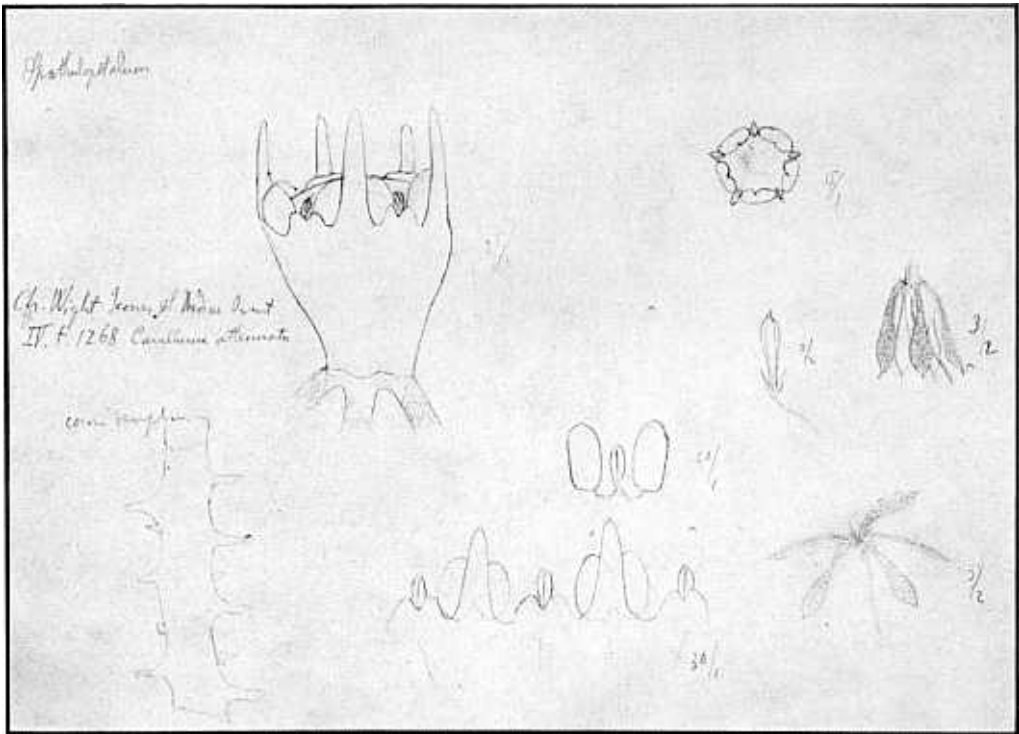


FIG. 137

Caralluma dicapuae Chiovenda

from a drawing by Prof. Emilio Chiovenda.

Corona: single, tubular, arising from the base of the staminal column, 10-toothed, with the teeth alternately linear elongated erect obtuse at the apex with the margins minutely papillose-serrulate, about 1 mm. long and 0.4 mm. broad at the base, whitish, and very short bifid rounded, the former series opposite the anthers and adnate, the latter opposite the pollen-masses;

Staminal column: 2.5 mm. long, 1.5 mm. broad, glabrous;

Follicles: linear, narrow, 11 to 13 cm. long, 4 to 5 mm. thick, glabrous.

Type locality: Eritrea: Habab: Chelamet-Oazat.

Distribution: Also recorded from Naro and between Naro and Moga.

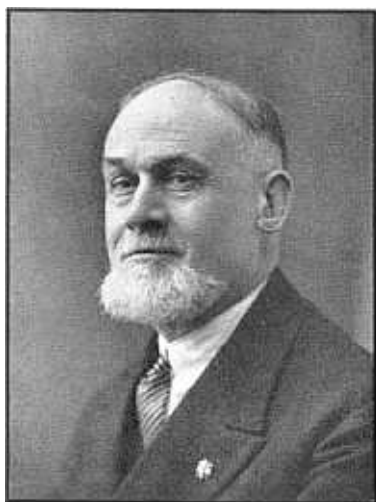


FIG. 138

Prof. Emilio Chiovenda

"Di Capua's *Caralluma*" is a plant of the *Eucaralluma* section very similar in general habit to *Caralluma vittata*, but somewhat

more robust. Its flowers have such a distinct corolla that Prof. Chiovenda formerly considered it as belonging to a genus all its own, *Spathulopetalum*. It was discovered in Eritrea by the Italian botanical explorers, Terracciano and Pappi, on May 11, 1892, and was first described by the botanist Di Capua, in whose honor Prof. Chiovenda later rechristened it. The curious corolla has a tiny central tube and half-inch spoon-shaped lobes, with a long narrow "handle" broadening at the apex and terminating in a minute apiculus. The cup-shaped corona is also singular, apparently 1-seriate, for the lobes which correspond to those of the outer and inner coronal series alternate in position along the rim of the cup, those corresponding to outer corona-lobes being very short, bifid and rounded, while those corresponding to inner corona-lobes are erect and linear.

12. *Caralluma gracilipes* K. Schumann, Engler: Pfl. Ost-Afr. C. 328. 1895.

(Description by Dr. N. E. Brown, Flora Trop. Afr., iv. i. 484):

Stems: about 12 to 15 in. high, 3 to 4 lin. thick in the lower part, gradually tapering and becoming slender in the upper part, 4-angled, minutely and distantly toothed (probably the teeth bear subulate deciduous leaves); terminal part slender, bearing as many as 15 distant flowers;

Pedicel: slender, $3\frac{1}{2}$ to 4 lin. long;

Corolla: about $4\frac{1}{2}$ lin. long, with an inflated tube;

Outer corona: lobes hardly conspicuous, arising considerably above the base of the staminal column;

Inner corona: lobes spatulate.

Type locality: Kenya: Ukamba: Kitui.

Distribution: Also in Tanganyika: in the plains between Kilimanjaro and the Pare Hills, 2,400 feet elevation.

The "slender-footed *Caralluma*" is one of two species which K. Schumann placed in his second section of *Carallumas*, called *Lalacruma*. This sectional name is an anagram of the generic name, *Caralluma*. The flowers in this section are characterized by the corona being raised conspicuously high on the staminal column. The long tapering stems of the *Eucarallumas* persist, however, and the coronal peculiarity may well be overlooked and the two species transferred to the *Eucaralluma* section. In Schumann's description of *Caralluma gracilipes* the stems are described as only $2\frac{1}{4}$ to $2\frac{3}{4}$ inches long, "the apex running out into a peduncle about a foot long." According to Dr. N. E. Brown this is intended to describe the gradual tapering of the stems, whose actual length may be understood to be around 15 inches. The species is imperfectly known, nothing being told of the flowers, except that they are about $\frac{1}{3}$ inch in size with an inflated tube. Hildebrandt, who discovered the plant near Kitui in Kenya, said that the stems furnished the natives with an ingredient of their arrow poisoning.

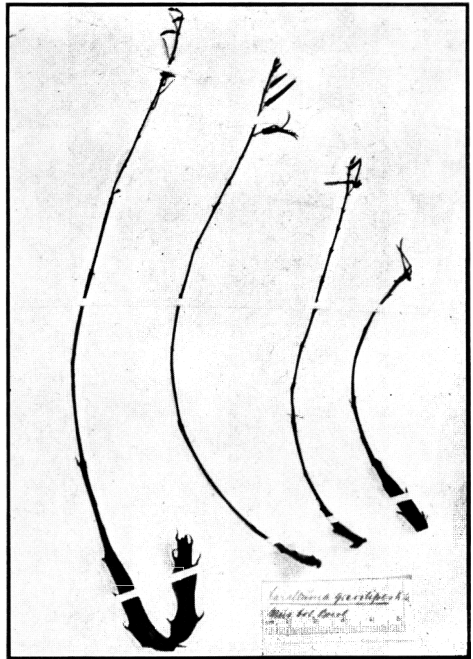


FIG. 138-A

Caralluma gracilipes K. Schumann

From a photograph of the type specimens in the Herbarium of the Berlin-Dahlem Botanic Museum.

13. *Caralluma priogonium* K. Schumann, Engler: Bot. Jahrb., xxxiv. 327. 1905.

(Description based on that by K. Schumann, l.c., translated from the Latin and German):

Stems: 30 to 45 cm. high, up to 4 cm. thick, branching freely from the ground, 4-angled; angles with large saw-like teeth and ovate-oblong acuminate leaves, $3\frac{1}{2}$ to 4 mm. long and rounded at the base;*Flowers*: in small fascicles of 4 to 5, sessile or on slender pedicels 4 to 6 mm. long, from the axils on the upper tapering portions of the stems, which are sometimes so slender as to be only 1 to 2 mm. in diameter;*Sepals*: 2 mm. long, oblong-triangular, acuminate, with a few papillae on the back;*Corolla*: 10 mm. in diameter, cleft to 1 mm. at the centre, rotate; *lobes* lanceolate, very shortly acuminate or rather mucronate, narrowed at the base and then widening again, outside glabrous, inside loosely hairy;*Outer corona*: lobes $\frac{1}{2}$ mm. long, oblong-ovate, acute;*Inner corona*: lobes short, truncate, minutely hairy at the tips.*Type locality*: Tanganyika: Usambara: between the northern slopes of the Usambara Mountains and Kihurio.*Distribution*: Also in the Pare Hills, near Makanya, altitude 2,100 feet.

FIG. 139

Caralluma priogonium K. Schumann

Photo by P. R. O. Bally of a plant in its natural surroundings near Makanya, in the Pare Hills, Tanganyika.

Discovered by Prof. A. Engler on Oct. 9, 1902, in the Kilimanjaro region of north-eastern Tanganyika, on the succulent plain between the northern slopes of the Usambara mountains and Kihurio. The stems

are a foot to a foot and a half high, 4-angled near the base with strongly toothed angles, from which the plant gets its name of the "Saw-angled *Caralluma*." The upper part of the stem is very slender and tapering,

the flowers growing in small clusters on the upper 8 inches. The flowers remain imperfectly known, about half an inch in size, loosely hairy on the inner face, with very deeply cleft lanceolate lobes. Mr. Bally writes us that he has collected both *C. priogonium* and *C. gracilipes* and found the following differences: "*C. priogonium* grows about twice the size of *C. gracilipes*,

otherwise the general appearance is much the same. I had no opportunity to compare the structure of the flowers, but, apart from the difference in their size, there is a marked difference in the shape of the seed-pods. The cross-section of the seed-pods of *C. priogonium* is flattened and lozenge shaped while the cross-section of those of *C. gracilipes* is circular."

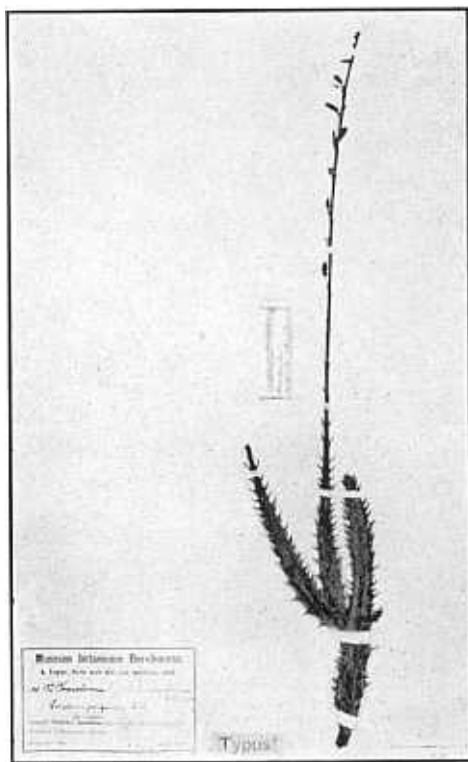


FIG. 139 A

Caralluma priogonium K. Schumann

From a photograph of the type specimen in the Herbarium of the Berlin-Dahlem Botanic Museum.

14. *Caralluma tuberculata* N. E. Brown, Gard. Chron., xii. 370. 1892.*Boucerosia aucheri* Decaisne, *sphalm.* pro *B. aucheriana*, ex Aitchison, Journ. Linn. Soc., 68. 1865.*Boucerosia aucheriana* Hooker fil., Flora Brit. Ind., iv. 78. 1885. *Nec* Decaisne, 1844.

(Description by Dr. Brown, l.c.) :

Plant: wholly glabrous, $2\frac{1}{2}$ to 6 in. high; *stems* $\frac{1}{3}$ to $\frac{1}{2}$ in. thick, 4-angled; angles toothed;*Flowers*: crowded into small umbels at the apex of the stems, dark purple-brown or blackish-purple;*Pedicel*: 1 lin. long;*Sepals*: $\frac{3}{4}$ lin. long, ovate-lanceolate, acute;*Corolla*: 7 lin. in diameter, rotate with a very short campanulate tube; lobes $2\frac{1}{2}$ to 3 lin. long, $1\frac{1}{4}$ to $1\frac{1}{2}$ lin. broad, oblong-lanceolate, subobtus with an inflexed apiculus, margins reflexed?, the face covered with small tubercles, the back glabrous and smooth;*Outer corona*: of 10 erect subulate teeth, about $\frac{1}{2}$ lin. long, formed by each of the 5 lobes being divided almost to the base into 2 slender teeth;*Inner corona*: of 5 linear lobes incumbent on the backs of the anthers and not produced beyond them.

Type locality: India: Punjab: Jhelum Distr., "over all the hills in the district."

Distribution: Recorded also from Baluchistan; and probably from Peshawar and Afghanistan.

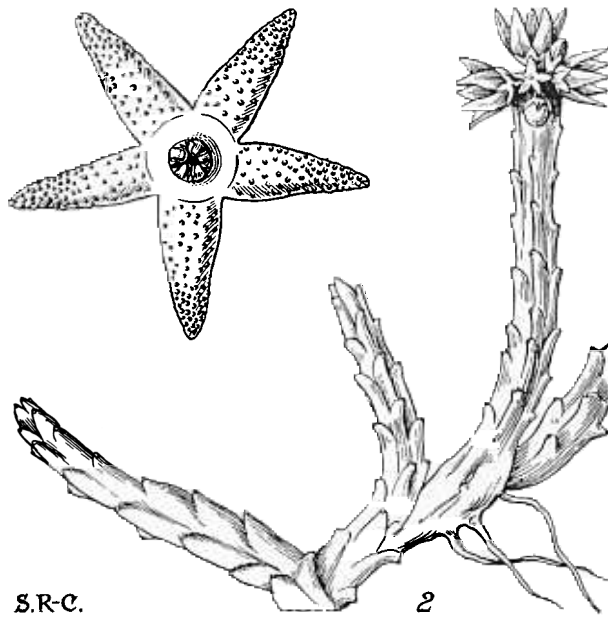


FIG. 140

Caralluma tuberculata N. E. Brown

1. Corolla x 3.

2. Flowering stem x 1.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

The "tubercled *Caralluma*" is a small species, with 4-angled stems $2\frac{1}{2}$ to 6 inches high. It derives its name from the small tubercles which cover the inner face of the

corolla-lobes. The plant appears to have a wide distribution, being recorded from the Punjab and Baluchistan, and probably also from Peshawar and Afghanistan. A speci-

men in the Calcutta Herbarium, from Cherat, Peshawar district, 4000 feet elevation, bears an interesting note under the name of Gen. Sir Henry Collett (distinguished British soldier and botanist, 1836-1901), dated 1892: "This is sold in the bazaars of Peshawar—and eaten fried with ghee—the juice of the plant (which is very bitter: C. G. Hastings, District Superintendent of Police) having first been expressed." The name of the plant is given as *pawuni* in the Pushtu language, and *chunga* in Punjabi.

C. tuberculata was discovered prior to 1865 by Dr. J. E. Tierney Aitchison, 1835-

1898, a Brigade Surgeon in the Bengal Medical Service, who became widely known as an authority on Indian botany and served as naturalist with the Afghan Delimitation Commission in 1884-85. In 1865 Aitchison published a Flora of the Jhelum District of the Punjab in the Journal of the Linnean Society. In this Flora he mentioned his plant, but confused it with Decaisne's *C. aucheriana* from Southern Arabia. It was only recognized as distinct by N. E. Brown in 1892, six years before Aitchison's death, and Aitchison himself may never have known that his *Caralluma* was a distinct species.

15. *Caralluma crenulata* Wallich, Pl. As. Rar., i. 6. 1830.*Boucerosia crenulata* Wight et Arnott, Contrib. Bot. Ind., 34. 1834.*Desmidorchis crenulata* Decaisne, Ann. Sc. Nat., ix. 266. 1838.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, Ind. Sp. Gen. Car., 21. 1931):

Stems: about 6 mm. in diameter and may attain a height of about 12 to 15 cm., but are commonly shorter than this; angles rounded;*Corolla*: in mature buds flat above; when expanded the lobes sometimes tend to bend upwards, particularly in preserved specimens; the color is rich brown and clear yellow arranged in broken but concentric streaks, the brown usually, but not always, predominating; there is usually a well-marked circle of yellow where the central cup joins the flattened portion of the flower;*Outer corona*: lobes small, with the members of adjacent pairs about as widely separated from each other as they are from the inner corona-lobes on either side of them;*Inner corona*: lobes usually pointed and often more or less trifid.

Type locality: Burma: Segain (opposite Ava) on the Irrawaddy.

Distribution: the dry zone of Burma, which lies along the Irrawaddy from Minbu to Mandalay; also from the Shan Plateau further east.

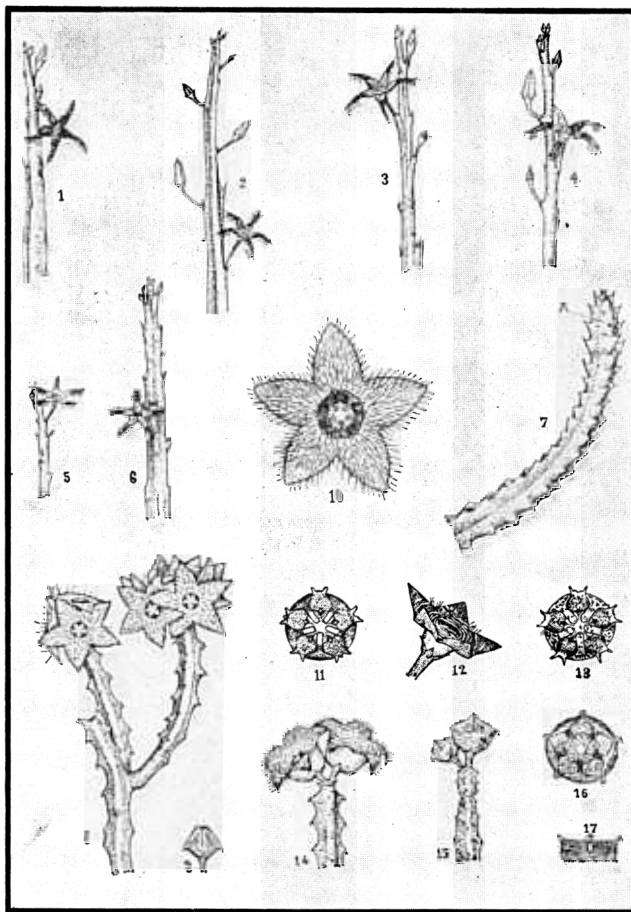


FIG. 141

From Gravely and Mayuranathan:
Indian Species of *Caralluma*, 1931.

1. Presumed hybrid between a form such as is shown in 6 and *C. stalagmifera* x 0.5
- 2-4. Presumed hybrids between *C. ascendens* var. *gracilis* and *C. stalagmifera* x 0.5
- 5-6 Presumed hybrids between *C. ascendens* var. *gracilis* and var. *attenuata* x 0.5
7. Stem of (?) *Caralluma tuberculata*, showing at A an umbel bud in axil of leaf, x 0.5
8. *Caralluma indica* x 0.5
9. *Caralluma indica* Bud x 0.5
10. *Caralluma indica* Flower x 1.
11. *Caralluma indica* Corona x 2.
12. *Caralluma crenulata* Flower x 0.5
13. *Caralluma crenulata* Corona x 2.
14. *Caralluma pauciflora* Flowers x 0.5
15. *Caralluma pauciflora* Buds x 0.5
16. *Caralluma pauciflora* Corona x 2.
17. *Caralluma pauciflora* Part of corona seen from side

The "crenulate *Caralluma*" was discovered by N. Wallich in Upper Burma in 1826. The plant may not actually grow on the Road to Mandalay, but it must come near having that distinction, for Wallich found it near Segain (or Sagaing), a short distance across the Irrawaddy, and it has been recorded also from Minbu, nearly half-way down the river towards Rangoon, and from the Shan table-land, which lies in part in the Mandalay District. The species appears to derive its name from the frequently notched lobes of the inner corona. The flowers are large, $1\frac{1}{4}$ inches in diameter, and grow in terminal umbels of 8 to 9. According to Dr. Gravelly and Mr. Mayuranathan, they are "related most closely to

Caralluma truncato-coronata, of which we have not seen specimens. As compared with the species with which we are familiar their most distinctive characters are found in the clubbed hairs on the margins of the bases of the corolla-lobes, the cup-shaped centre and flattened outer parts of the corolla, and the white or yellowish ground color with purple spots of the corona. In Madras, flowers are produced only during and shortly after the heavy rains of the north-east monsoon in about November." Berger, who had this *Caralluma* in cultivation about 1903, speaks of it as a very handsome species. Unfortunately it has now once more entirely disappeared from cultivation.

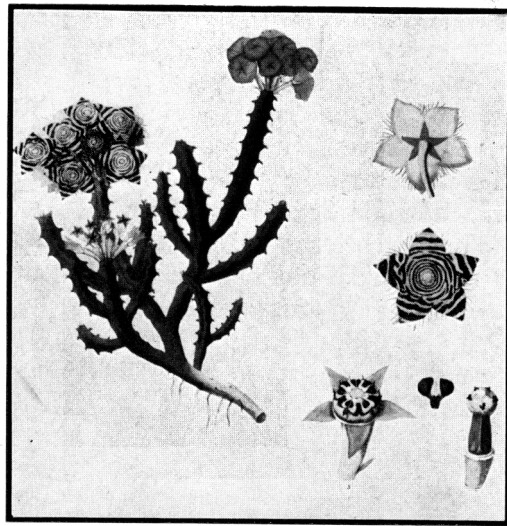


FIG. 142 .

Caralluma crenulata Wallich x 0.5
From Wallich: Plant. As. Rar., 1830.

16. *Caralluma truncato-coronata* (Sedgwick) Gravely et Mayuranathan, Ind. Sp. Gen. Car. 21. 1931.

Boucerosia truncato-coronata Sedgwick, Journ. Ind. Bot., ii. 126. 1921.

(Description based on that by L. J. Sedgwick, l.c., translated from the Latin):

Plant: fleshy, glabrous, spreading; *stems* numerous, up to 15 cm. high, 6 mm. thick, not tapering, 4-angled, with deeply furrowed sides and minute ovate rudimentary leaves on the tubercles of the angles;

Flowers: in terminal umbels, 13 together in the specimen seen;

Bracts: $2\frac{1}{2}$ mm. long, linear;

*Pedice*l: 17 mm. long;

Sepals: 4 mm. long, linear, acute;

Corolla: in bud pentagonal, flat at the apex, $8\frac{1}{2}$ mm. wide; when expanded campanulate, tube 6x6 mm.; outside green, slightly mottled with purple on the limb; inside purple or almost black, with many concentric yellow pellucid broken furrows; *lobes* when expanded probably erect, but perhaps spreading, with a few clavate hairs at the sinuses;

Corona: colored like the inner part of the corolla;

Outer corona: lobes truncate with a minute tooth at each side;

Inner corona: lobes strap-shaped, elongated, ascending, appressed on the anthers.

Type locality: India: Bombay Presidency: Dharwar Distr.: near Hubli.

Distribution: Not further recorded.

The "Caralluma with a truncate corona" was discovered by L. J. Sedgwick in Sept., 1919, in the Carnatic region of Bombay, growing on a dry hill, scattered under bushes, at an altitude of 2000 feet. The rainfall in this locality is given at 30 inches annually. The plant is called by Mr. Sedgwick "an inconspicuous plant with elegant flowers." The flowers form terminal umbels and are purplish on the concentric

rugosities of the inner corolla face with linear yellow markings in the furrows between, the lobes ciliate at the base with a few clavate hairs. While the species appears to be nearly related to *Caralluma crenulata*, it differs very much from that plant and from all the other Indian species in "having the bifid outer corona-lobes reduced to a broadly truncate top with minute horns or teeth at each end."

17. *Caralluma indica* (Wight et Arnott) N. E. Brown, Gard. Chron., xii. 369. 1892.

Hutchinia indica Wight et Arnott, Contrib. Bot. Ind., 34. 1834.

Boucerosia hutchinia Decaisne, de Candolle: Prodr. viii. 649. 1844.

(Description by P. V. Mayuranathan):

Plant: a small fleshy herb with horizontally spreading underground stems from which arise branching shoots; *stems* erect or decumbent, 4-sided, rounded at the corners, 4 mm. across, 10 to 15 cm. long; leaves deciduous, lanceolate, recurved;

Flowers: in 3 to 12-flowered umbels; smelling like fungus;

Corolla: in mature buds conical with the apex of the cone depressed; when expanded rotate, 2 cm. in diameter, pale green covered with purple hairs all over the inside except the portion near to the apex of the lobes; *lobes* narrow and sharply pointed;

Outer corona: lobes erect, light yellowish, sometimes with the extreme tip purplish; with a minute yellowish tooth usually present in the deep cleft between adjacent lobes;

Inner corona: lobes incumbent on the anthers and not produced beyond them, their tips bright yellow.

Type locality: India: Madras Presidency: near Madras.

Distribution: Recorded from the Chingleput, Nellore and South Arcot Districts; and probably also from North Arcot Distr.

The "Indian *Caralluma*" is native to the Madras Presidency, and was discovered near Madras by Dr. R. Wight before 1834. With *Caralluma pauciflora* it is distinguished, according to Dr. Gravelly and Mr. Mayuranathan (Ind. Sp. Gen. Caral., 18), in that "the creeping stems spread entirely underground sending up erect loosely branched stems at intervals. These latter stems often die down in hot dry weather to be renewed from the underground stems when more favorable conditions return." We quote further from the same author's account of the plant (op. cit., 23): "The dark purple hairs of this species contrast strongly with the light green corolla-lobes, which are narrower and more sharply pointed than in *Caralluma crenulata* or *C. pauciflora* and are more or less completely without hair at their tips. The matured buds are conical above, with the apex of the cone slightly depressed (Fig. 141:9). The outer corona-lobes are erect, light yellowish, sometimes with the extreme tip purplish. The inner corona-lobes are not unlike those of *Caralluma pauciflora*, but are more yellowish at the tip. Adjacent segments have a deep cleft between them,

usually (but not always) with a minute yellowish tooth projecting into it. They have never been seen so united with this tooth and one another as to form a single trifid

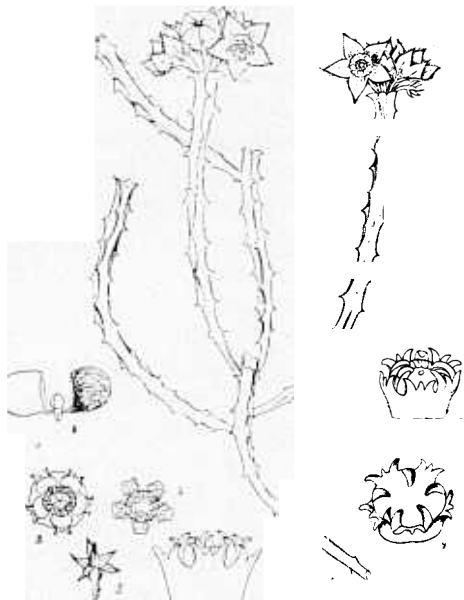


FIG. 143

Caralluma indica N. E. Brown

Drawing by Rungiah, from Wight: Icones Plantarum Ind. Orient., 1842.

lobe as shown in Wight's figure (Fig. 143). In this figure, too, as in his figure of *Caralluma adscendens* var. *attenuata* (Fig. 129), the angles of the stems are made so prominent as to appear strongly acute, instead of rounded as they actually are. The stems are of about the same thickness as in *C. pauciflora*, but longer and slenderer. They rarely, if ever, rise erect to a height of more than about 10 cm., but may be longer when parts are more or less procumbent. The smell of this species is unlike that of any other known to us, resembling that of fungus rather than that of carrion. It seems to attract small ants, not flies. The species flowers only in the north-east monsoon."

18. *Caralluma diffusa* (Wight) N. E. Brown, Gard. Chron., xii. 369. 1892.

Boucerosia diffusa Wight, Icon. Pl. Ind. Orient., iv. t. 1599. 1850.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, Ind. Sp. Gen. Car., 26. 1931):

Stems: closely resembling those of *Caralluma umbellata*, but never attaining the size of those of the larger strains of that species;

Corolla: deeply campanulate with deeply divided lobes, matured buds always being conical above; surface of the lobes hairless, but the dark streaks are minutely papillose though somewhat less so than in *C. umbellata*; there are a number of long and easily detached hairs on the margins in all specimens that have yet been recorded;

Outer corona: lobes more closely in contact at their base with each other than with the inner corona-lobes, which are somewhat variable in shape.

Type locality: India: Madras Presidency: Coimbatore Distr.: arid rocky mountains near Coimbatore, at 2000 feet elevation.

Distribution: Also recorded from Arcot Distr.: sacred hill at Tiruvannamalai; and probably from Mysore State: near Bangalore.



The "diffuse *Caralluma*" was discovered near Coimbatore in southern India by Dr. Robert Wight prior to 1850. The stems are like those of *Caralluma umbellata*, but smaller and forming "diffuse" clumps often several square feet in extent. The 1-inch flowers grow in large terminal clusters. They are deeply campanulate, whitish on the inner face with dark purple lines, the lobes ciliate. (See Fig. 145: 10-12). The outer corona is bowl-shaped, the lobes of two deeply cleft, arching divergent segments; the inner corona-lobes are linear-obtuse and incumbent over the anthers. According to Dr. Gravely and Mr. Mayuranathan, p. 25, "this is a much less abundant species than *Caralluma umbellata* and we have not as yet noticed any marked color variation in it. We have, however, one strain which differs from the typical form in having thinner stems, smaller umbels (not more than about a dozen flowers) and narrower and more acutely pointed corolla-lobes, the matured buds being consequently more acutely conical above. Unfortunately we have no clue to the original habitat of this form, which we first saw cultivated as a rock plant in a Madras garden."

19. *Caralluma procumbens* Gravely et Mayuranathan, Ind. Sp. Gen. Car., 26. 1931.

(Description by Dr. F. H. Gravely and P. V. Mayuranathan, l.c.):

Stems: about 15 mm. broad, resembling those of the "Umbellata group" in the acuteness of their angles and in not, so far as we know, producing any underground branches; but instead of forming more or less compact clusters of upright branches they remain procumbent, branching little, trailing over rocks and rooting where opportunity occurs; they may reach a length of over six feet; the protuberances marking the position of the leaf scars are very indistinctly indicated;

Flowers: terminal in small umbels; but the stem commonly sends out a side shoot from the axil of a leaf immediately below and this grows so as to push the umbel rather to one side; the result is that the flowers of this species and of the northern species we believe to be *Caralluma tuberculata* come to occupy very similar positions, though arising in quite different ways; the stems and manner of growth of the two plants are of course also quite different;

Corolla: slightly smaller than that of *Caralluma diffusa* and about equally strongly campanulate, but much thicker and firmer and entirely without hairs; the ground-color of the lobes is whitish and the streaks are purple; a few purple dots are often found on the outer sides of the lobes in addition to the streaks on the inner sides;

Corona: whitish, mottled with a pale purplish color (see Fig. 145:17).

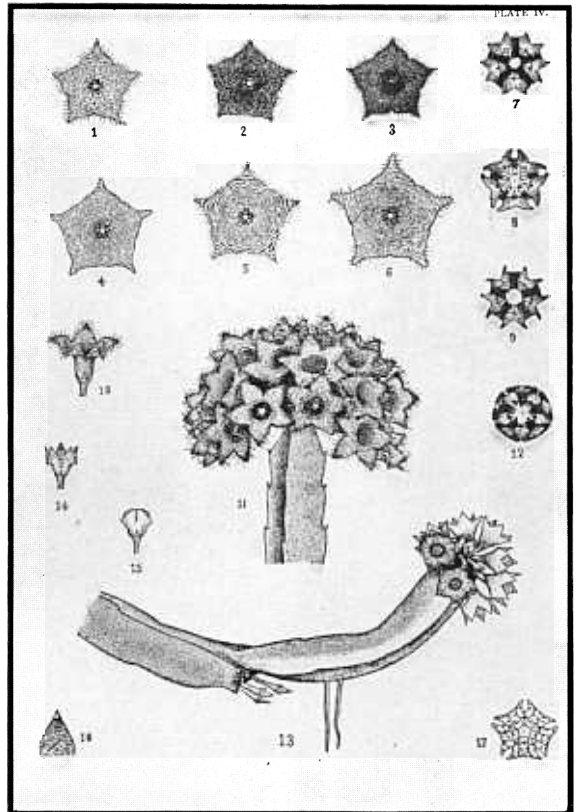
Type locality: India: South Travancore: near Maruthuamalai.

Distribution: Also recorded from Aramboli.

FIG. 145

From Gravely and Mayuranathan: Indian Species of *Caralluma*, 1931.

- 1-6. *Caralluma (Boucerosia) umbellata*. Flowers x 0.5, showing variation.
- 7-9. *Caralluma (Boucerosia) umbellata* Corona x 2., showing var.
10. *Caralluma (Boucerosia) diffusa*. Flower x 0.5
11. *Caralluma (Boucerosia) diffusa*. Umbel x 0.5
12. *Caralluma (Boucerosia) diffusa*. Corona x 2.
13. *Caralluma (Boucerosia) procumbens* x 0.5, showing habit.
14. *Caralluma (Boucerosia) procumbens*. Flower x 0.5
15. *Caralluma (Boucerosia) procumbens*. Bud x 0.5
16. *Caralluma (Boucerosia) procumbens*. Inner side of corolla-lobe x 1.
17. *Caralluma (Boucerosia) procumbens*. Corona x 3.



The "trailing *Caralluma*" was discovered by P. V. Mayuranathan in South Travancore, at the southern tip of British India, about 1930. It is a remarkable species, the stems being greatly elongated, sometimes to over six feet, and trailing along in crevices between rocks, rooting as opportunity permits. This straggling mode of growth differs from that of all other *Carallumas*, so that the plant might be considered as

the type for a special group of species if it did not stand so completely alone. In other respects it is so closely allied to the "Umbellata group" that Dr. Gravely and Mr. Mayuranathan have included it within that group.

The flowers form small terminal umbels. They are campanulate, whitish streaked with purple on the inner surface and entirely without hairs and not ciliate.

20. *Caralluma umbellata* Haworth, Syn. Pl. Succ., 47. 1812.*Stapelia umbellata* Roxburgh, Pl. Coast of Corom., iii. 36. 1819.*Boucerosia umbellata* Wight et Arnott, Contrib. Bot. Ind., 34. 1834.*Desmidorchis umbellata* Decaisne, Ann. Sc. Nat., ix. 266. 1838.*Boucerosia lasiantha* Wight, Icon. Pl. Ind. Orient., iv. t. 1286. 1850.*Boucerosia campanulata* Wight, Icon. Pl. Ind. Orient., iv. t. 1287. 1850.*Caralluma lasiantha* N. E. Brown, Gard. Chron., xii. 369. 1892.*Caralluma campanulata* N. E. Brown, Gard. Chron., xii. 369. 1892.

(Description based on that by Dr. F. H. Gravely and P. V. Mayuranathan, Ind. Sp. Gen. Car., 23. 1931):

Plant: spreading over surface of ground, usually forming dense and extensive clusters of erect and acutely rectangular *branches*, 12 to 24 in. high; angles acute, sometimes produced into a series of more or less distinct teeth, sometimes not;

Flowers: in large terminal umbels;

Corolla: in bud varying in shape somewhat with the shape of the flower, but always much more flattened both above and below than in *Caralluma diffusa*; when expanded about 1 in. in diameter, but variable in size, the larger flowers as a rule distinctly subcampanulate, while small ones are flattened; usually more or less hairy throughout, never with hair (ciliation) on margins of lobes only, color variable from yellow with purplish streaks to uniform rich deep purplish-brown;

Outer corona: cup-shaped at the base, the lobes dividing into 2 slightly arched segments;

Inner corona: lobes incumbent upon the anthers.

Type locality: India: "Coast of Coromandel," without precise locality.

Distribution: Very widely distributed in the Madras Presidency, including Anantapur, Chingleput, Chittoor, Cuddapah, North Arcot and Salem districts, South Malabar, Mysore, etc. The type of f. *lasiantha* came from the Nagari Hills, and this form is also recorded from Pondicherry and the island of Ceylon.

A very variable and interesting species, probably first introduced to England by Dr. William Roxburgh. Its discovery in Mysore by Lady Clive about 1800 has been referred to at p. 89. It was included in the posthumous final volume of Roxburgh's sumptuous Plants of the Coast of Coromandel in 1819 (see Fig. 147). The delay in the completion of this volume evidently allowed some of Roxburgh's materials to become known to Haworth and other botanists, for Haworth published *Caralluma umbellata* in the Synopsis of 1812, saying it had been introduced in 1804, and in 1816 a plate was included in the Hortus Sempervivens of Johann Kerner, a volume now ranked as one of the greatest of botanical rarities. According to Dr. Gravely and Mr. Mayuranathan *C. umbellata* must be considered as including two overlapping forms, heretofore considered as distinct

species, *C. lasiantha* and *C. campanulata*. These three specific names, the "umbellate *Caralluma*," the "hairy-flowered" and the "bell-shaped," give a very good idea of the flowers. They grow in large terminal umbels of 40 or more, the larger ones are campanulate in shape, the smaller ones more flattened, all more or less hairy on the inner surface. The type, it is true, has always been described as hairless. "We were greatly surprised, therefore," write Dr. Gravely and Mr. Mayuranathan, "when we failed to find any such form in any of the places where we collected, and we began to suspect that the hairless character attributed to most of the specimens on which the records were based must be the result of the ease with which the hairs disappear in preserved specimens and not of actual hairlessness. . . . The commonest form is the one with comparatively small, flattened



FIG. 146
Caralluma umbellata Haworth (f. *campanulata*)
x 0.5
From Curtis's Botanical Magazine, 1893.

and very hairy flowers, to which the name *lasiantha* is generally applied. It is variable in color, the relative amounts of the yellowish ground and the purplish streaks differing greatly in different specimens, plants the flowers of which contrast strongly with one another in this respect often growing within a few yards of one another (see Fig. 145: 1-9). We have never seen any plants in which the dark streaks are absent, but we have met with two, one from the Anantapur District and the other probably from near Bangalore, in which no trace of the ground color remains, the flower being a uniform rich deep purplish-brown throughout. . . . In many flowers the dark streaks, if examined with a lens, are found to be thickly covered with minute tubercles, many of which are elongated into hairs varying from quite minute to 1 mm. or

more in length. The longer ones swing freely from their bases and are readily shed, which the shorter ones naturally are not; but there does not appear to be any sharp fundamental distinction between them. In other flowers the dark streaks are smoother, and though they usually—perhaps always in the small flattened type of flower—bear long hairs which are easily shed, there may be few if any shorter ones to indicate the essential unity of these with the minute tubercles from among which they arise. Near Battarahalli in the Salem District one

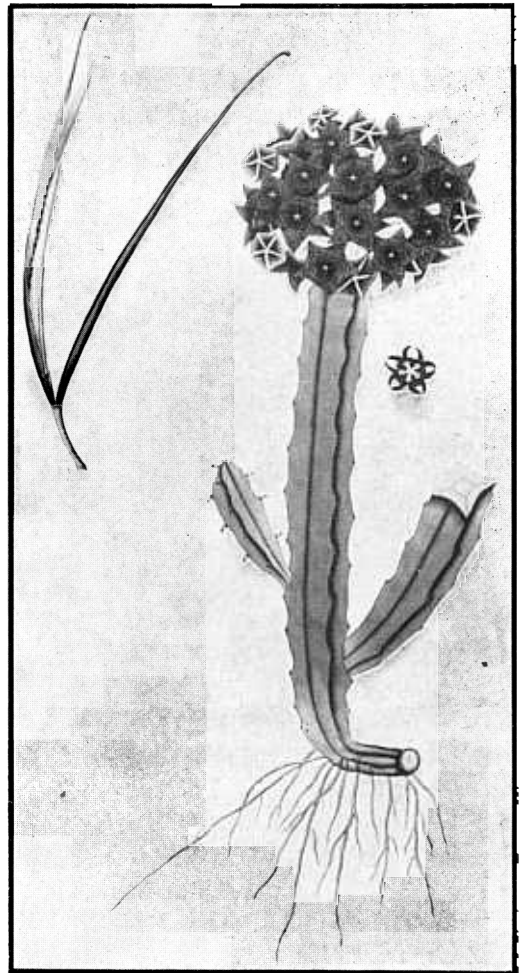


FIG. 147
Caralluma umbellata Haworth x 0.5
from Roxburgh: Plants of the Coast of Coromandel,
1819.

of us had the good fortune to find a number of specimens in flower together. Most of these were of the large subcampanulate type figured by Roxburgh, but covered with hairs, mostly rather short. With them were, however, others that were smaller and flatter, resembling typical *lasiantha* in all points except the hair which, as in the larger flowers, was mostly rather short. Large, subcampanulate and at first sight apparently hairless flowers have been collected at Tiruvannamalai and Pudukkottai, in company with hairy ones. These apparently hairless flowers are all paler in color

(after preservation in formalin) than are the Battarahalli flowers and do not seem to bear the dense coat of short hairs that is shown by the latter, though some such hairs can be seen near the centre with the aid of a lens. As the long hairs are altogether absent, the flowers appear hairless to the naked eye. We therefore find it impossible to draw any hard and fast line between *umbellata* and *lasiantha*. Typical hairless *umbellata* is so much rarer than the transitional forms that we cannot reasonably regard it even as a really distinct variety between which and the commoner hairy forms

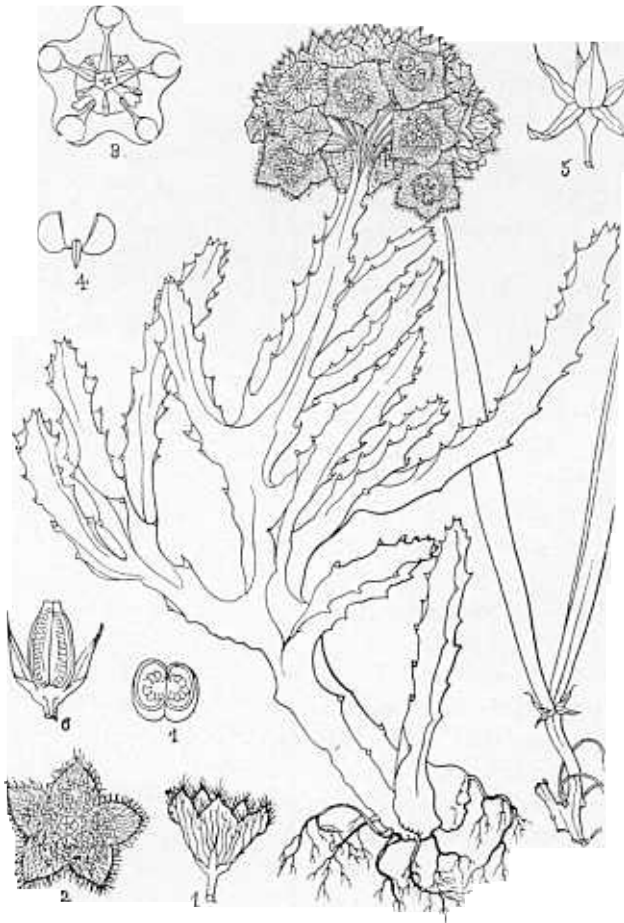


FIG. 148

Caralluma umbellata Haworth (f. *campanulata*)

2. Flower x 0.75

From a drawing by Gorindoo in Wight: *Icones Plantarum Ind. Orient.*, 1850

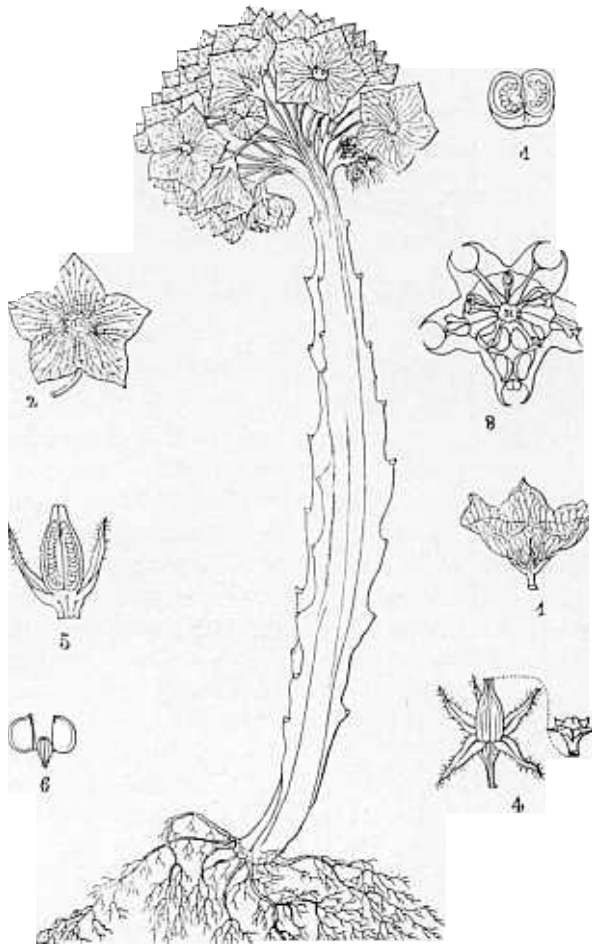


FIG. 149

Caralluma umbellata Haworth (f. *lasiantha*)

2. Flower x 0.75

From a drawing by Gorindoo in Wight: *Icones Plantarum Ind. Orient.*, 1850.

the transitional ones might otherwise have been hybrids; nor can it apparently be regarded as a geographical race. . . . On the same grounds we believe that *campanulata* should also be regarded as a synonym. There is nothing in the original description and figure by Wight to separate it from *umbellata*, unless it be the combination of its uniformly dark color with Wight's description of the corolla-tube as "glabrous on both sides." We should certainly have expected any such dark form to have been finely and densely pilose within, even in the absence of long hairs. As, however, Wight

"received the specimens without the station being marked," they cannot have been fresh and any such pilosity might readily have been overlooked. But even if renewed examination of the type should prove the corolla to be absolutely smooth we should still feel that this additional variation, though not quite on the lines we have actually observed, was too small a departure from them to be likely to have any greater taxonomic value than other characters which, for reasons already given, we have been compelled to disregard in dealing with the present species."

21. ***Caralluma aucheriana*** (Decaisne) N. E. Brown, Gard. Chron., xii. 369. 1892.

Boucerosia aucheriana Decaisne, de Candolle: Prodrômus, viii. 649. 1844.

(Description based on that by E. Boissier, Flôra Orient, v. 63. 1879. Translated from the Latin):

Plant: robust, erect, 6 in. high, branching; *branches* 4-angled, finger-thick; angles acute, almost saw-toothed; teeth subquadrate, usually hard;

Flowers: in fascicles at the apex of the stems;

Corolla: yellow, about $\frac{1}{2}$ in. in diameter.

Type locality: South-eastern Arabia: Oman: without precise locality.

Distribution: Not further known.

An imperfectly known species, named for its discoverer, Pierre Martin Rémi Aucher-Eloy (1792-1838), a French traveler who made explorations in the near East between 1830 and 1838. It is described as having erect branching stems, with clusters of small yellow flowers at the apex. Sir Joseph Hooker considered the plant identical with *Caralluma tuberculata*; but while the two

are certainly related, they appear to be fairly distinct, at least in color. It is noteworthy that *C. aucheriana* grows in the most easterly angle of Arabia, just across the Sea of Oman from Baluchistan and the southern end of Iran. It doubtless marks a milestone on the road which the STAPELIEAE traveled between India and the African continent.

22. *Caralluma flava* N. E. Brown, Kew Bull., 335. 1894.

(Description by Dr. Brown, l.c., translated from the Latin):

Plant: 6 to 8 in. high; *stems* $\frac{1}{2}$ to $\frac{3}{4}$ in. thick, 4-angled, branching, glabrous; angles acute, with short broadly triangular spreading teeth;

Flowers: many in sessile terminal umbels;

Pedicel: 5 to 7 lin. long, elongate, glabrous;

Sepals: 1 lin. long, lanceolate, acute, glabrous;

Corolla: subrotate, yellow; tube shortly campanulate, $\frac{1}{8}$ in. long; *lobes* 4 to 5 lin. long, $1\frac{1}{2}$ to 2 lin. broad, spreading, oblong, acute or subacute, glabrous, with reflexed margins;

Outer corona: lobes $\frac{1}{2}$ lin. long, deeply bifid, with the segments subulate and arched-diverging;

Inner corona: lobes linear, obtuse, incumbent over the anthers and not produced at the apex.

Type locality: Southern Arabia: Hadramaut: Wadi Hadiea.

Distribution: Also recorded from Saihut.

Caralluma flava is a "yellow-flowered *Caralluma*," with large terminal umbels to the 8-inch stems. The flowers have a short campanulate tube and glabrous pointed lobes, the entire corolla about an inch in diameter. The narrower shape of the corolla-lobes contrasts with the broadly triangular lobes of the Indian *Boucerosias* and with those of most of the other Arabian species and such African species as *Caralluma retrospiciens* and *C. europaea*. The

outer corona-lobes are deeply cleft into two divergent arching segments. According to Dr. Brown, the nearest relationship of the plant is probably to the imperfectly known *Caralluma aucheriana*, "but according to the description of the flowers of that species given by Boissier, *Caralluma flava* clearly differs by its long pedicels and much longer corolla." *C. flava* was collected by Theodore Bent in Hadramaut in 1894, and it was from Bent's specimens that the species was described. It was also collected by Leo Hirsch, near Saihut, and as Hirsch's collections were mostly made in 1893 he may have been the actual discoverer of the species.

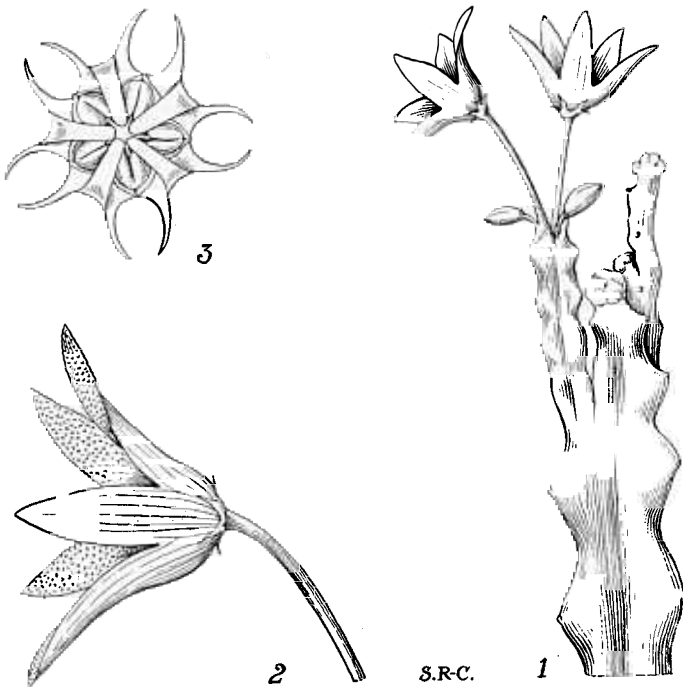


FIG. 150

Caralluma flava N. E. Brown x 1.

2. Corolla x 2.

3. Corona x 8.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

23. *Caralluma awdeliana* (Deflers) Berger, Stap. und Klein., 81. 1910.*Boucerosia awdeliana* Deflers, Bull. Soc. Bot. Fr., 23. 1896.

(Description based on that by A. Deflers, l.c., translated from the Latin):

Plant: a greyish-green succulent herb, branching freely from the base; *stems* erect, 20 to 30 cm. high, 4-angled, the slightly concave sides 1 to 2 cm. broad, or 3 cm. in older stems, marbled with red patches; angles obtuse with short teeth and tiny acute leaves which soon fall away;

Flowers: in clusters of 5 to 15 at the apex of the stems;

Bracts: bristle-like and soon withering;

*Pedice*l: 5 to 7 mm. long;

Sepals: deltoid-obtuse, forming a calyx 2 to 3 mm. in diameter;

Corolla: 8 to 12 mm. in diameter, campanulate; greenish-red without, dotted red, minutely puberulous; sulphur-yellow within, marbled with many dark purple spots, glabrous; *lobes* a little longer than the tube, lanceolate, acuminate, with revolute margins and the sinuses between the lobes consequently retroflexed;

Outer corona: rose-colored with purple lines, glabrous, cup-shaped at the base; lobes 2 mm. long, purple at the tips, 2-horned, the horns linear, curving and diverging;

Inner corona: lobes deep purple, adnate at the base to the outer corona lobes between their two horns, incumbent over the anthers and shorter than them.

Type locality: Southern Arabia: Bilad Awdeli: north slope of Mt. Nakhai, at 2000 feet elevation.

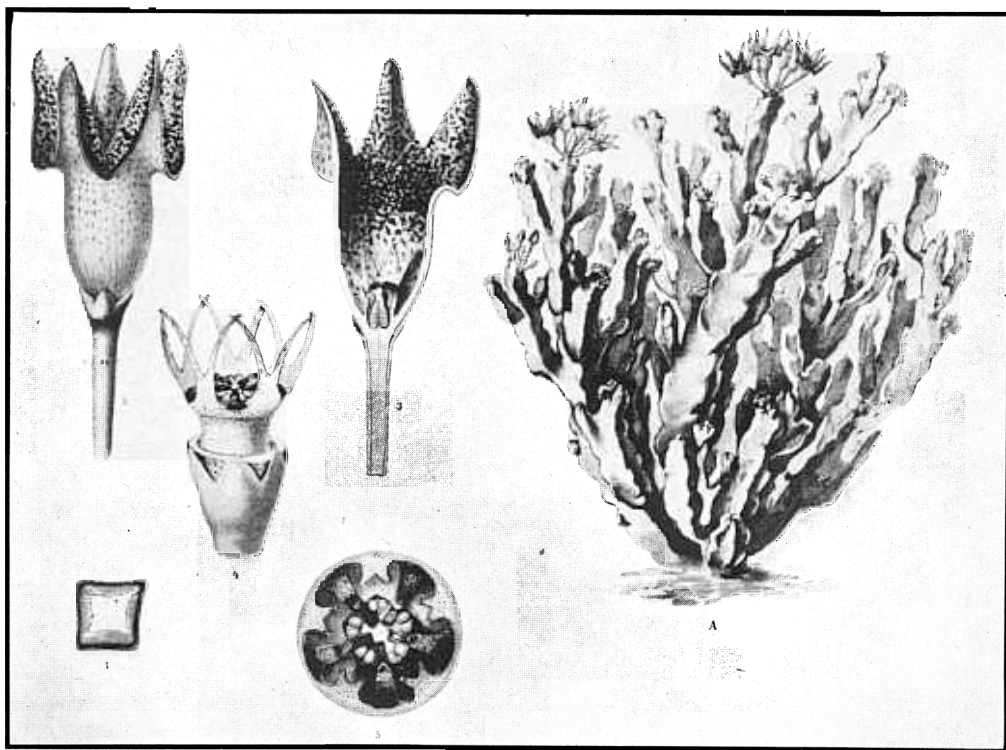


FIG. 151

Caralluma awdeliana Berger

m Deflers: Asclép. de l'Arabie Trop. 896

Distribution: Not further known.

This species derives its name from Bilad Awdeli, a district in Southern Arabia, 100 miles north east of Aden, where it was discovered by A. Deflers in March, 1890, on the northerly slopes of Mt. Nakhai. Deflers described the plant as grouped with other Stapeliads on rocks and in sandy places, forming islands of tufts of considerable extent among the more predominating succulent Euphorbias.

C. awdeliana much resembles *C. arabica*, in particular as to the corona, which is

virtually identical. The 1½-inch flowers are yellow marbled with dark purple spots, forming terminal clusters of 5 to 15 individuals. In *C. arabica* the flowers are of about the same size, but uniformly dark purple and in somewhat larger clusters. Its central tube is also proportionately smaller than in *C. awdeliana*. On further study, it is probable that *C. awdeliana* will be referred to *C. arabica* as a variety. Neither species is at present in cultivation.

24. *Caralluma penicillata* (Deflers) N. E. Brown, Gard. Chron., xii. 370. 1892.*Boucerosia penicillata* Deflers, Voy. Yemen, 169. 1889.*Echidnopsis golathi* Schweinfurth, ex Deflers: Asclép. Arab. Trop., 267. 1896.

(Description based on that by A. Deflers, Voy. Yemen, l.c., translated from the Latin):

Stems: 2 to 3 cm. thick, branching, succulent, 4-angled; angles with obtuse teeth;*Flowers*: small, in dense umbels;*Pedice*l: 8 to 10 mm. long, without bracts;*Sepals*: lanceolate, obtuse, spreading;*Corolla*: pale green outside, livid brown inside with yellowish spots; lobed more than half-way down; lobes lanceolate with a brush-like tuft of elongated clavate purple hairs at the apex;*Outer corona*: cup-shaped, of 5 pouch-like connate lobes, nearly truncate or very broadly triangular at the upper edge, very thinly covered with short hairs all over;*Inner corona*: lobes like short teeth, growing out of the outer corona and arching-incumbent on the anthers.

Type locality: Southern Arabia: Wolledje, Gebel Melhan.

Distribution: Also in Yemen: at Hodjela.

Caralluma penicillata is the largest and most conspicuous of the Arabian *Carallumas*, one of the giants among Stapeliads. Its 3-inch stems build large clumps, 2 to 3 feet tall, bearing lateral globular umbels of 20 to 50 livid brown flowers, marked all over with round pale yellow spots. It was discovered by Prof. Schweinfurth in Yemen on January 18, 1889. He believed the plant to be an *Echidnopsis*, because the corona seems to consist of a single series of lobes, after the fashion of one or two species of *Echidnopsis*. However, the tessellate character of their stems is the only criterion of the different species of *Echidnopsis*, and *C. penicillata* has stems which emphatically belong among those of the larger *Carallumas* of Southern Arabia and North Africa. Schweinfurth said the native name for the plant was *Golathi*, and Deflers cited several variants of the name, *Gallaḥ*, *Ghalet*, *Gollatik*, etc. The specific name, the "Painter's-brush *Caralluma*,"



FIG. 152

Caralluma penicillata var. *robusta*, comb. nov.

Photo by R. J. Darvall, showing the slender habit of the stems, as contrasted with that of *C. retrospiciens*, the blunt and non-recurving teeth, and the scars where the flower umbels were scattered throughout the last few inches of each stem.

refers to the curious tufts of long vibratile purple hairs at the incurved tips of the corolla-lobes.

Var. a. *Caralluma penicillata* var. *robusta* (N. E. Brown), comb. nov.

Caralluma robusta N. E. Brown, Flora Trop. Afr., iv. i. 482. 1904.

(Description by Dr. Brown, l.c.):

Stems: tall, robust, 1 to 3 in. square, acutely 4-angled, glabrous and apparently glaucous; angles toothed; teeth rather small, 1 to 2 lin. long, deltoid, horizontally spreading;

Flowers: in lateral umbels, which are sessile or on very short (1 to 3 lin. long) lateral shoots, scattered along the upper part of the stems, globose, 20 to 40 or more flowered, $\frac{3}{4}$ to $1\frac{1}{4}$ in. in diameter;

Pedicel: about 4 lin. long, glabrous;

Sepals: 1 to $1\frac{1}{4}$ lin. long, oblong or oblong-lanceolate, acute;

Corolla: about 4 (to 5?) lin. in diameter, rotate; lobes $1\frac{1}{4}$ to 2? lin. long, 1 to $1\frac{1}{4}$ lin. broad, ovate, acute, tuberculate within, with a tuft of long vibratile purple hairs at the incurved apex, glabrous outside;

Outer corona: arising about $\frac{1}{4}$ lin. above the base of the staminal column and reaching to its top, cup-shaped, subtruncate, forming 5 pouches alternating with the anthers, sparsely covered with short spreading hairs all over, outside and inside;

Inner corona: lobes minute, incumbent on the backs of the anthers and shorter than them, dorsally adnate to the outer corona, and appearing to be 5 minute inflexed teeth of the latter, glabrous.

Type locality: Eritrea: Arrot Valley, to the south of Aideroso, 4,300 feet elevation.

Distribution: Also near Acur, 6,000 feet elevation; Sudan: Kassala Province: Sinkat.

The "robust variety" was discovered by Schweinfurth and Riva in the mountains of Eritrea on April 4, 1892, and we believe it to be the same as a plant recently collected by our collaborator, R. J. Darvall, near Sinkat in the Anglo-Egyptian Sudan. Occasional clumps of the plant grow among the scattered colonies of *Caralluma retrospiciens* and at first sight are easily mistaken for it, because of their large size. But closer inspection reveals a definitely slighter stem structure and the absence of any recurvature of the teeth. The flowers also are altogether different from those of *C. retrospiciens*. They grow in smaller umbels, on the sides of the stems, not at the apex, and have longer pedicels, more pointed corolla-lobes and a lighter color. The corolla is glabrous, except for a wisp of purple hairs at the tips of the lobes, a feature which immediately suggests kinship to *C. penicillata* and *C. edithae*. In the latter, however, the flower umbels are terminal and the outer corona is distinctly lobed. The actual similarity is wholly in the direction of *C. penicillata*, both as to the general habit of



FIG. 153

Caralluma penicillata var.
robusta, comb. nov.

Drawing of a flower, x 1., from
Sinkat, Sudan, by R. J. Darvall.

growth and as to the details of the coronal structure. Dr. Brown considered the plant from Eritrea as having the outer corona sufficiently different from *C. penicillata* to constitute a distinct species; but Berger later pointed out that the coronas were really virtually identical, and he proposed uniting the two plants into a single species. The form of the corona is interesting, in that it appears to consist of only one series of lobes. The outer corona is cupular, with five connate pouch-like lobes, whose broadly triangular edges are nearly truncate. The inner corona-lobes are minute teeth, incumbent over the anthers, arising from the edges of the outer corona-lobes, some-

what after the fashion of the coronal architecture of *C. quadrangula*.

The principal difference between the two plants will be found in the color of the corolla. In the Arabian type of *C. penicillata*, the ground color is brown, marked to the tips with uniform light yellow spots; in the African var. *robusta*, the disk and lower two-thirds of the lobes are greenish-

yellow, marked with small purple spots, shading to pronouncedly purple tips. There are several cases where Stapeliads from the Yemen section of Arabia reappear in Eritrea or the Sudan, either unchanged or in slightly modified varieties, and we believe the var. *robusta* furnishes another instance of this close botanical connection between the two sides of the Red Sea.

25. *Caralluma arabica* N. E. Brown, Kew Bull., 318. 1895.

(Description by Dr. Brown, l.c., translated from the Latin):

Flowers: in terminal umbels, wholly glabrous;

*Pedice*l: $1\frac{1}{2}$ to 2 lin. long;

Sepals: ovate, acute $\frac{1}{2}$ to $\frac{2}{3}$ lin. long;

Corolla: tube shortly campanulate, $1\frac{1}{3}$ lin. long; lobes 2 lin. long and $1\frac{1}{2}$ lin. broad, ovate, acute, smooth, dark purple;

Outer corona: lobes $\frac{3}{4}$ lin. long, deeply bifid; segments $\frac{1}{2}$ lin. long, linear-filiform, obtuse, erect, curved at the apex, much exceeding the staminal column;

Inner corona: lobes $\frac{1}{4}$ to $\frac{1}{3}$ lin. long, linear, obtuse, incumbent over the anthers and nearly equaling them, with a small protuberance at the back.

Type locality: Southern Arabia: Hadramaut: Wadi Raida, near Saihut.

Distribution: Not further recorded.

The "Arabian *Caralluma*" was discovered in Hadramaut by Leo Hirsch, 1893. The stems resemble those of the Indian species, *Caralluma tuberculata*, and make one wonder what intermediate and related forms may yet remain undiscovered in the

intervening regions, especially of southern Iran. The $\frac{1}{2}$ -inch glabrous dark-purple flowers, with short triangular lobes, are borne in terminal clusters of 20 to 25. The outer corona is bowl-shaped, the lobes formed of two tall diverging segments.

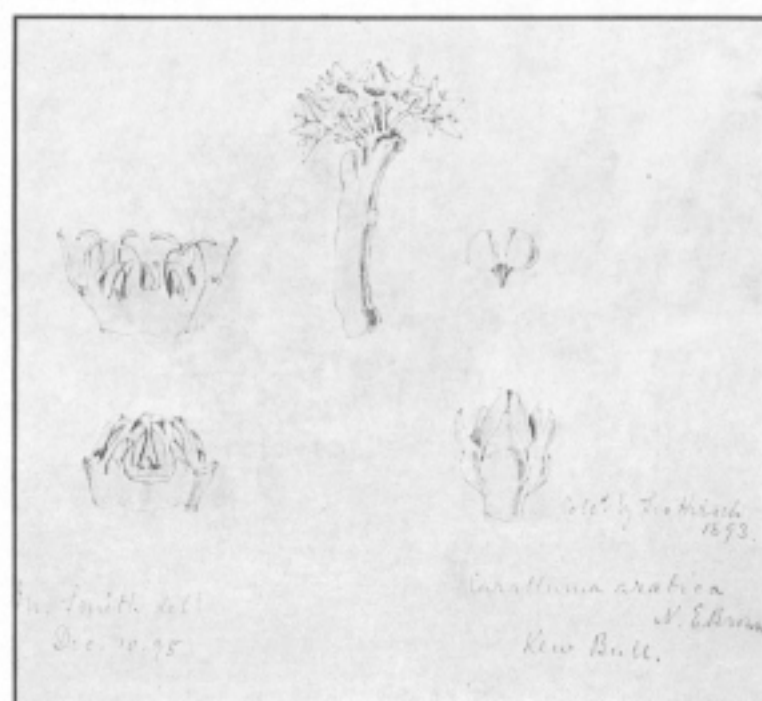


FIG. 154

Caralluma arabica N. E. Brown

Drawing by Miss Matilda Smith. Reproduced by permission of the Director, Royal Botanic Gardens, Kew.

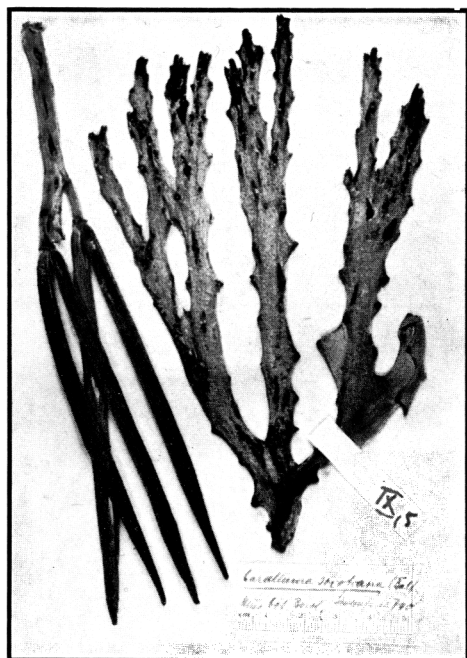
26. *Caralluma socotrana* (Balfour fil.) N. E. Brown, Gard. Chron., xii. 370. 1892.*Boucerosia socotrana* Balfour fil., Proc. Roy. Soc. Edin., xii. 79. 1884.

(Description adapted from that by I. B. Balfour, l.c., translated from the Latin):

Stems: 4-angled; angles sinuate with spine-like teeth;*Corolla*: dark blood-red;*Outer corona*: lobes deeply bifid, the segments subulate;*Inner corona*: lobes arising between the outer corona-lobes and smaller, bent inwards over the anthers.

Type locality: Socotra: without precise locality.

Distribution: Recorded from Galonsir.



The "Socotra Caralluma" was collected on the island of Socotra by Prof. Isaac Bayley Balfour in the winter of 1880-81. He found it plentifully distributed on the limestone plains and low hillocks. In May, 1881, it was again collected by Prof. Schweinfurth, near Galonsir. The dark red flowers grow in small clusters near the tips of the forking stems. They have a deep tube, three-quarters of an inch long, with short acute lobes about $\frac{1}{3}$ inch long.

FIG. 154-A

Caralluma socotrana Balfour fil.

From a photograph of a specimen collected by G. A. Schweinfurth, in the Herbarium of the Berlin-Dahlem Botanic Museum.

27. *Caralluma adenensis* (Deflers) Berger, Stap. und Klein., 79. 1910.

Boucerosia adenensis Deflers, Bull. Soc. Bot. Fr., 22. 1896.

(Description based on that by A. Deflers, l.c., translated from the Latin):

Plant: a pale green succulent herb, branching from the base, forming clumps to 60 cm. high; *stems* 2 to 3 cm. square, robust, erect, 4-angled, obtusely toothed, the sides concave or quite flat, leafless;

Flowers: in dense globose heads of 25 to 40 at the apex of the branches;

Bracts: numerous, narrowly linear, 4 to 8 mm. long, intermixed among the flowers at their base;

Pedicel: 10 mm. long, fleshy, glabrous;

Sepals: 8 mm. long, linear, with 3 nerves on back, shortly revolute at the tip, papillose;

Corolla: glabrous, greenish outside, dark purple inside, verrucose; *tube* 10 mm. long, campanulate, abruptly spreading into the flat or convex limb; *lobes* 8 to 9 mm. long, deltoid, acuminate, shorter than the tube;

Outer corona: rose-colored, cup-shaped at the base; lobes erect, 4 mm. long, 2-horned, obtuse, pubescent;

Inner corona: lobes adnate at the base to the cup of the outer corona, glabrous, the tips incumbent over the anthers and longer than them;

Follicles: 18 to 20 cm. long, $\frac{1}{2}$ to $\frac{3}{4}$ cm. thick, glabrous.

Type locality: Southern Arabia: Aden Peninsula: Wadi Ma'alla.

Distribution: Also in Aden Peninsula: foot of Mt. Cham Cham; Bilad Fodhli: Wadi Eybad, near Schoukra; foot of Mt. Nakha'i; Bilad Jafa: foot of Mt. Heys, near Masana.

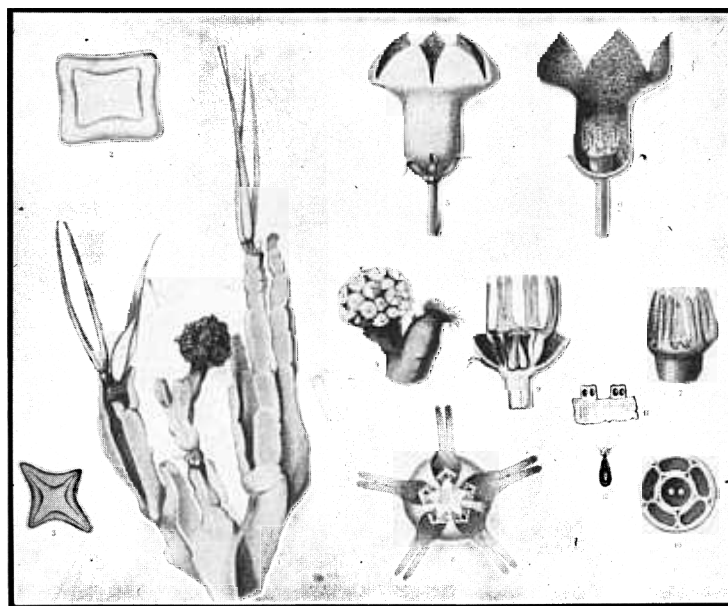


FIG. 155

Caralluma adenensis Berger

5. Flower x 1.

From Deflers: Asclép. de l'Arabie Trop 1896.

This is the largest Arabian Stapeliad, the stems attaining a height of 2 feet and the dark purple flowers forming large terminal clusters of 25 to 40 individuals, each an inch in diameter. It foreshadows the African *Caralluma retropiciens*, but the flowers can be easily distinguished by their deeper central tube and their wholly glabrous corolla. The stems too are much less strongly toothed. Schweinfurth says that

stems are found, as much as 8 inches long, which are entirely smooth and without a trace of teeth. He was the discoverer of the species, which he first collected near Aden on March 13, 1881. Deflers described it fifteen years later, after collecting it at numerous points along the Arabian coastline. He called it "a magnificent plant, the flowers at times almost odorless, at other times emitting a fetid odor of carrion."

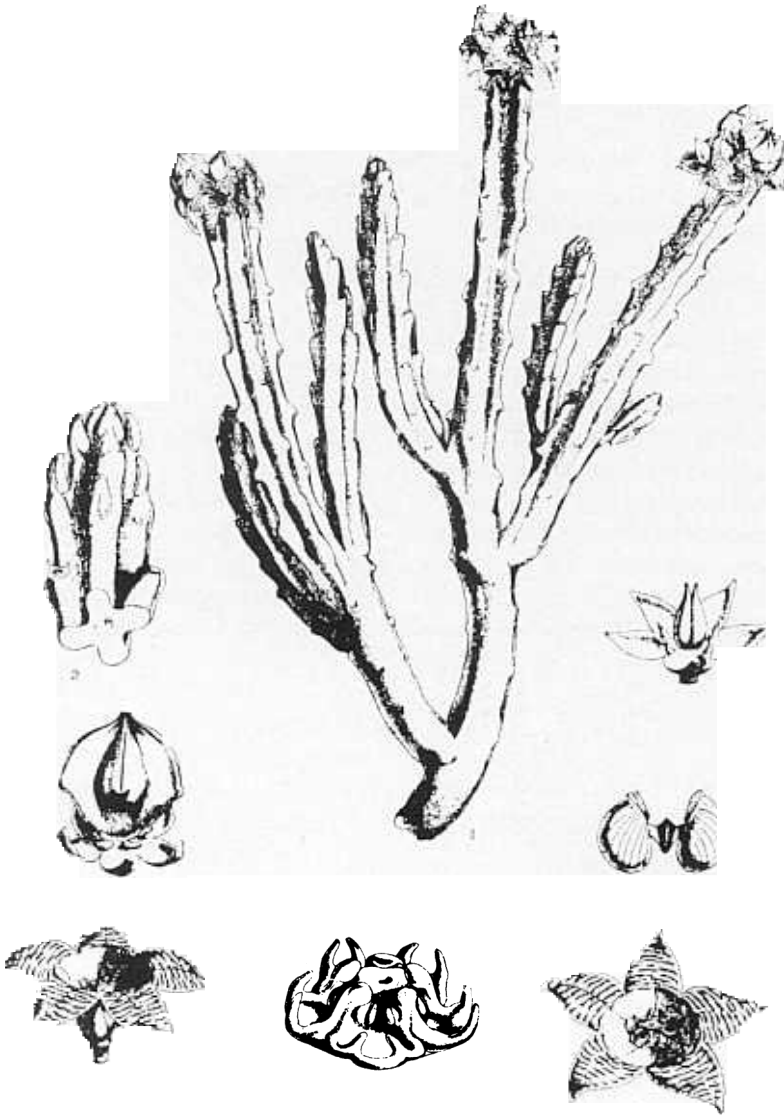


FIG. 156

Caralluma aaronis N. E. Brown

4. Flower $\times 2.5$

Drawing by W. H. Fitch in Trans. Royal Irish Acad., 1885.

28. *Caralluma aaronis* (Hart) N. E. Brown, Gard. Chron., xii. 369. 1892.

Boucerosia aaronis Hart, Trans. Roy. Irish Acad., xxviii. 436. 1885.

(Description combining that by H. C. Hart, l.c., translated from the Latin, and one by G. Post, Flora of Syria, Palestine and Sinai, 527. 1896):

Plant: a succulent herb, 4 to 6 in. high; *stems* erect, sparingly branched, 4-angled; angles acute, remotely tubercled, dentate;

Flowers: clustered at the apex of the stems; flowering in December;

Corolla: banded with livid purple, $\frac{1}{2}$ in. in diameter, with ovate-deltoid lobes, glabrous or obsoletely puberulous within;

Outer corona: lobes bifid, with spreading segments, slightly shorter than the inner corona-lobes;

Inner corona: lobes incumbent on the anthers, oblong and very obtuse.

Type locality: Transjordan: Mount Hor.

Distribution: Also in Palestine: in fissures of chalk rocks near Jerusalem; about Jebel Harum and Abu Kosheibeh.

"Aaron's Caralluma" was discovered about 1885 by Henry Chichester Hart in the north-western section of Arabia, which now forms a part of the British mandate of Transjordan. There is an historical interest associated with its name, in that Hart collected the plant on Mount Hor, reputed to be the biblical scene of the death of Aaron, "in the edge of the land of Edom." It grows also on chalk cliffs near Jerusalem. Botanically the species is of interest, as it furnishes an Asiatic counterpart of *Caral-*

luma europaea.

C. aaronis differs from *C. europaea* hardly at all, either in plant stem or in its flowers, except in a detail of the outer corona. As in the type of *C. europaea* the outer corona is formed of a series of distinct pouches, intergrown at the base; but in *C. aaronis* the little golden knobs on the rim of each pouch (so characteristic of the type and the African varieties of *C. europaea*) are not found, being foreshadowed only by two flat brown tips.

29. *Caralluma burchardii* N. E. Brown, Kew Bull., 121. 1913.

(Description by Dr. Brown, l.c., translated from the Latin):

Stems: succulent, erect, branching, 7 to 50 cm. long, $1\frac{1}{2}$ to 2 cm. thick, subacutely 4-angled; angles toothed; teeth (rudimentary leaves) 1 mm. long, deflexed, broadly deltoid;*Flowers*: in fascicles near the apex of the stems, sessile;*Sepals*: 3 mm. long, lanceolate, acute, glabrous;*Corolla*: rotate, 13 mm. in diameter, inside white without spots, hairy, outside olive-brown (Burchard); *lobes* 4 mm. long, $3\frac{1}{2}$ mm. broad, ovate, acute;*Outer corona*: cup-shaped, 10-toothed, yellow; teeth 1mm. long, erect, subulate;*Inner corona*: lobes yellow, 1 to $1\frac{1}{4}$ mm. long, incumbent on the anthers and equaling them, linear, obtuse;*Follicles*: 7 to 8 cm. long, 7 to 8 mm. thick, terete, acute, glabrous, striped with purple; *seeds* 6 mm. long, $3\frac{1}{2}$ mm. broad, oblong-obovate, flat, broadly margined, glabrous, pale brown.

Type locality: Canary Islands: northern part of the island of Fuerteventura.

Distribution: Not further known.

"Burchard's *Caralluma*" is the only species of the STAPELIEAE recorded from the Canary Islands. It grows generally throughout the northern part of the island of Fuerteventura, on recent lava streams, on the tops of volcanoes and on clay soil. The stems are extremely irregular, sometimes like exaggerated stems of *Caralluma europaea*. The flowers, too, have a general resemblance to those of *C. europaea*, but the outer corona is not divided into little pouches as in that species, but is of the bowl type, the margin ten-toothed. The corolla is unmarked on the inner face and is so densely covered with delicate white hairs, as if with fine snow, that the ground color

underneath is not visible at all. The plant is named for Dr. O. Burchard, of La Orotava, the principal authority on the plants of the Canary Islands, who discovered it in 1912.

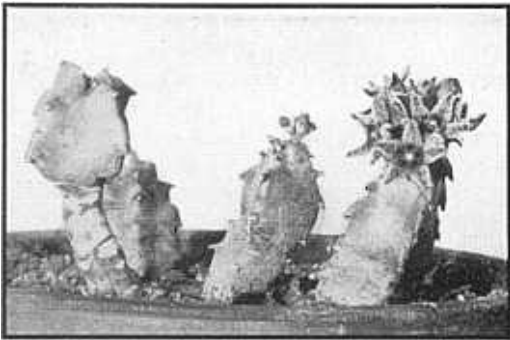


FIG. 157

Caralluma burchardii N. E. Brown x 0.5

FIG. 158

Caralluma burchardii N. E. Brown x 1.5
Freak flowers.



FIG. 159

Caralluma burchardii N. E. Brown x 3. A freak flower.

Var. a. *Caralluma burchardii* var. *maura* Maire, Bull. Soc. Hist. Nat. Afr. Nord, xiv. 156. 1923.

(Description summarized from that by Dr. R. Maire, l.c., translated from the Latin) :

Stems: 15 to 50 cm. high, $1\frac{1}{2}$ to 2 cm. thick, 4-angled, more or less marbled with purple, more or less concave on the sides, with a few very minute subtriangular leaves;

Flowers: in fascicles of 3 to 9 near the apex of the stems;

Pedicel: 6 to 7 mm. long, glabrous;

Sepals: 2 to $2\frac{1}{2}$ mm. long, glabrous, lanceolate, subacute, erect-spreading, not reaching to the sinuses between the corolla-lobes;

Corolla: 7 to 9 mm. in diameter, broadly campanulate, lobed to half-way down, outside glabrous, sparsely and irregularly papillate-punctate, brownish-green, inside dark olive-green without markings, densely covered with long flexible snowy hairs so as to appear white, not ciliate; *tube* about $\frac{1}{4}$ of the corolla in size, appressed to the staminal column, glabrous and olive-green at the bottom; *lobes* broadly ovate, 3 mm. long and equally broad, erect-spreading, subacuminate at the apex, subrevolute at the margins;

Outer corona: cup-shaped, exceeding the corolla-tube, subcircular or obscurely pentagonal, with 10 subulate teeth, $1\frac{1}{2}$ mm. long, at the apex somewhat obtuse and uncinatate on outer side, alternating in pairs with the inner corona-lobes, glabrous, golden;

Inner corona: lobes $1\frac{1}{2}$ mm. long, linear, obtuse or blunt at the apex, incumbent on the anthers, adnate at the base to the outer corona, golden.

Type locality: South-western Morocco: near Agadir-n-Ighir.

Distribution: Not further known.

The "moorish variety" of *Caralluma burchardii* was discovered by Dr. R. Maire near Agadir on the south west coast of Morocco, about 300 miles by sea across from Fuerteventura Island in the Canaries. It grows freely here, on the chalk cliffs and in thickets among the hills, in association with *Euphorbia beaumierana* and *Kleinia anteuphorbium*. It differs from the type in having its flowers pediceled and not sessile, with a smaller diameter (7 to 9 mm. instead of 12 to 13 mm.), the corolla campanulate instead of rotate, and the outer corolla-lobes longer and hooked at the apex.

The stems of *C. burchardii* are prone to develop considerable underground growth. We have had potted plants of the var. *maura* send stems down through the hole in the bottom of the pots, which have promptly resumed their natural appearance upon reaching the light.

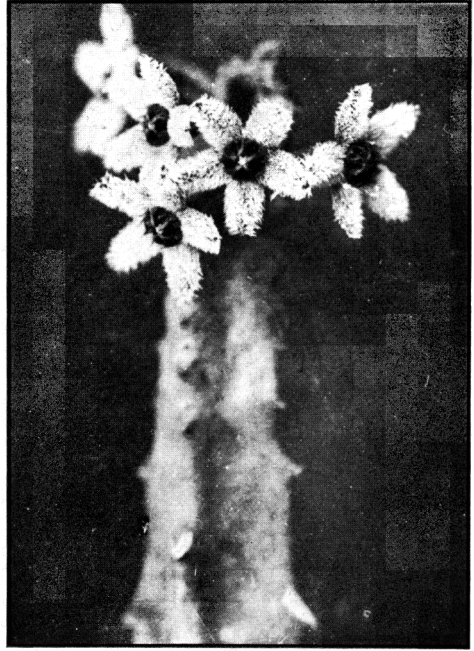


FIG. 160

Caralluma burchardii var. *maura* Maire x 2.

Photo by Emile Jahandiez.

30. *Caralluma europaea* (Gussone) N. E. Brown, Gard. Chron., xii. 369. 1892.*Stapelia europaea* Gussone, Flor. Sicul. Prodr., Suppl., i. 64. 1832.*Apteranthes gussoneana* Mikan, Nov. Act. Nat. Cur., xvii. 594. 1835.*Stapelia gussoneana* Jacquin fil., ex Lindley: Bot. Reg., t. 1731. 1835.*Boucerosia gussoniana* Hooker fil., Bot. Mag., t. 5087. 1858.*Boucerosia europaea* Hooker fil., Bot. Mag., text. ad t. 6137. 1874.

(Description modified from that by Sir Joseph D. Hooker, Bot. Mag., 1858):

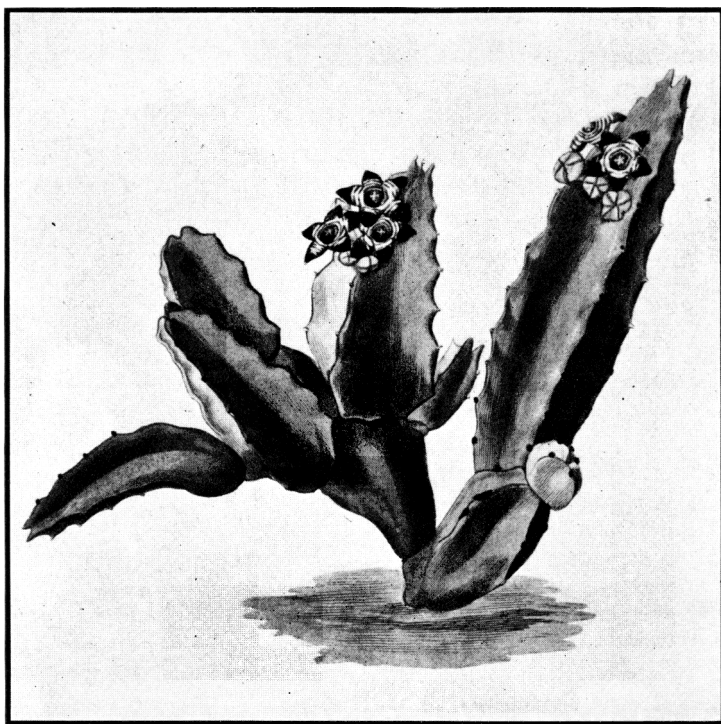
Stems: about as thick as one's finger, 4-angled, more or less deeply channeled between the angles;*Flowers*: small, in umbels springing from the apex of a stem, or from a little below the apex, 5 to 7 or 8 in an umbel;*Pedice*l: very short;*Sepals*: lanceolate, acute, spreading;*Corolla*: scarcely $\frac{3}{4}$ inch in diameter, rotate, fleshy, pale yellow, mottled and banded with dingy purple, hairy on the disk around the corona; lobes ovate, soon recurved, ciliate;*Corona*: sunk in the short tube of the corolla;*Outer corona*: of five dark purple pouches, bearing two bright yellow globose knobs at the rim;*Inner corona*: lobes triangular, close pressed upon the anthers.*Type locality*: Mediterranean Sea: Island of Lampedusa.*Distribution*: Probably restricted to this island and the neighboring island of Linosa.

FIG. 161

Caralluma europaea N. E. Brown x 0.75

From Lindley's Botanical Register, 1835.

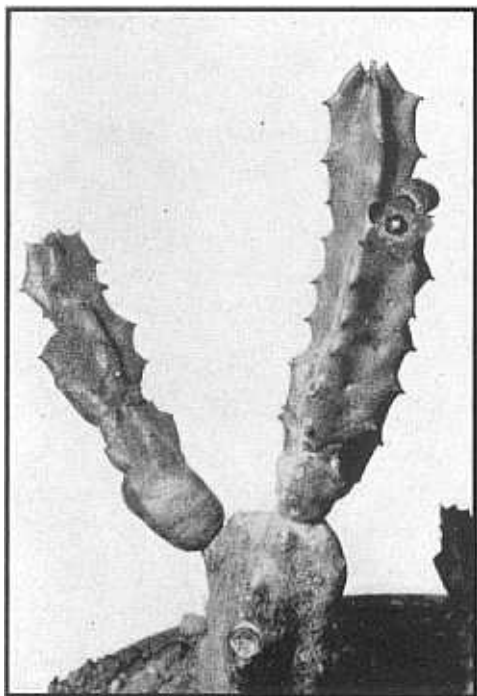


FIG. 162

Caralluma europaea N. E. Brown x 0.75

The "European *Caralluma*" is a species of particular interest, in that it is one of the only two *Stapeliads* known in Europe, the second being *Caralluma munbyana* var. *hispanica*. It was discovered by Giovanni Gussone on chalk cliffs of the island of Lampedusa, south-west from Malta, in 1832. The island belongs to Italy and technically forms a part of Europe. *C. europaea*, in its var. *confusa*, is also a native of southern Spain. The other varieties are from the Mediterranean coast region of north Africa. In its wide range the stems of *C. europaea* vary very little. They are irregular at all times, erect or procumbent, branching at will and often running awhile underground. Their sides are almost flat in the mature growth, the angles with blunt teeth tipped with tiny rudimentary leaves. The flowers vary in two respects. First in the appearance of the corolla, in which the de-

tails of the markings and of the ciliation differ materially in the several varieties; and second in the structure of the outer corona-lobes, those of the variety *confusa* presenting one form and those of the type and the remaining varieties presenting a second form. In the type the outer corona consists of 5 distinct pouches, intergrown at the base, the upper rim of each pouch bearing two very characteristic little golden knobs, and these persist in all the African varieties. In the Spanish variety, var. *confusa*, the knobs disappear and the outer corona-lobes are produced above their pouch-like body in two long segments. At first *C. europaea* was rather naturally considered to be a *Stapelia* and its discovery on a Mediterranean island aroused much interest among botanists. The younger Jacquin made the plant known at a meeting of naturalists at Vienna in 1832, and he wrote of it as follows in the Botanical Register for 1835: "It is one of the greatest geographical curiosities we know. The genus *Stapelia*, extensive as it is in species, does not possess one other which is not found in South Africa; so that this, which is a native of rocks on the south of Sicily, is cut off, as far as we know, from all the remainder of the genus, by the whole continent of Africa. Are we to infer from this that Central Africa contains *Stapelias* in its unknown Flora, or is this a northern form, having no connection with the Hottentot races except in general structure? Perhaps we shall be justified in assuming the former to be the more probable theory, if we take into consideration that Forskal found a plant without flower, which he took for a *Stapelia* in Arabia, and that *Carallumas*, which are altogether like *Stapelias* in habit, are found in Continental India."

The Arabs of the Mediterranean region in Africa call all the forms of *C. europaea* which grow there by the name of *Dachmous* (or *Damus*) and eat the stems.

Var. a. *Caralluma europaea* var. *marmaricensis* Berger, Stap. und Klein., 95. 1910.

(Description summarized from that by A. Berger, l.c.):

Stems: as in the type, but perhaps somewhat more slender;

Corolla: pale yellow, greenish towards the tips of the lobes, with concentric red-brown bands extending to the very tips of the lobes; covered to the sinuses of the lobes with fairly long white hairs and ciliate with longer flatter white hairs.

Type locality: Libia: the coast of Marmarica, 300 miles west of Alexandria, near Tobruk.

Distribution: Probably from other points in this region.

The "Marmarica variety," from the Roman coast of Marmarica near ancient Antipyrgos, was discovered by Prof. Schweinfurth on April 3, 1883. The flowers have a yellowish ground-color with red-brown transverse stripes extending to the tips of the corolla-lobes. The lobes spread out flat, as do those in the type, and contrast with the recurved corolla of the var. *simonis* and the incurved lobes of the var. *maroccana*.

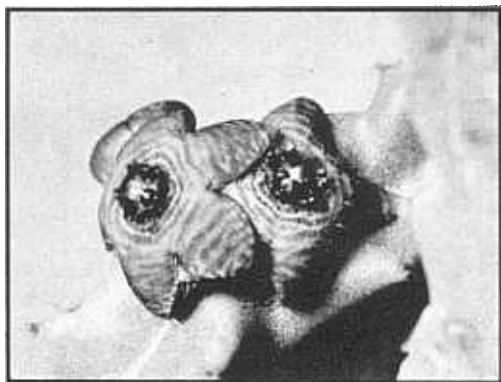


FIG. 163

Caralluma europaea var. *marmaricensis*
Berger x 2.

Var. b. *Caralluma europaea* var. *simonis* Berger, Stap. und Klein., 95. 1910.

Caralluma simonis Hort., ex Berger: Monatsschr. Kakt., xiv. 4. 1904.

Boucerosia simonis Hort., ex Berger: Stap. und Klein., 96. 1910.

(Description summarized from that by A. Berger, l.c.):

Corolla: 13 mm. in diameter, very much recurved outwardly; *disk* greenish-white, with 2 to 5 purple-brown circular stripes, covered with long white or brown-red hairs; *lobes* broader than long, wholly purple-brown, glabrous on the upper part, ciliate with long hairs, white at the base, brown-red towards the tips;

Corona: as in the type, but the gold knobs on the outer corona-lobes somewhat longer and closer together, so that they touch.

Type locality: Unknown; first described from garden plants.

Distribution: Frequent in Algeria and Tunis. Less frequent in Morocco: Djebel El-Maiz; etc.

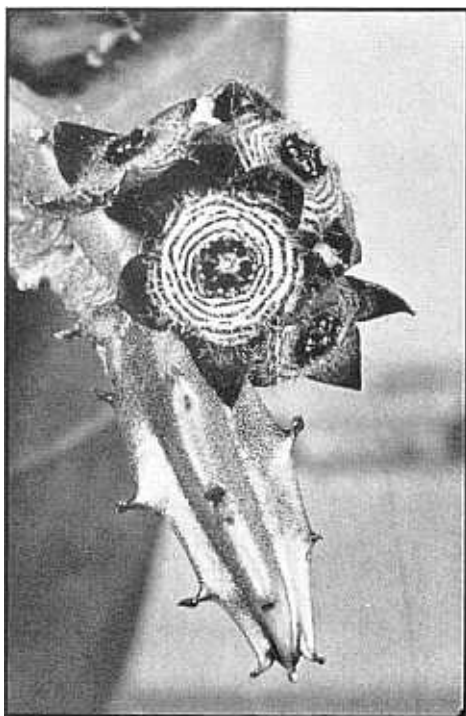


FIG. 164

Caralluma europaea var. *simonis* Berger x 3.

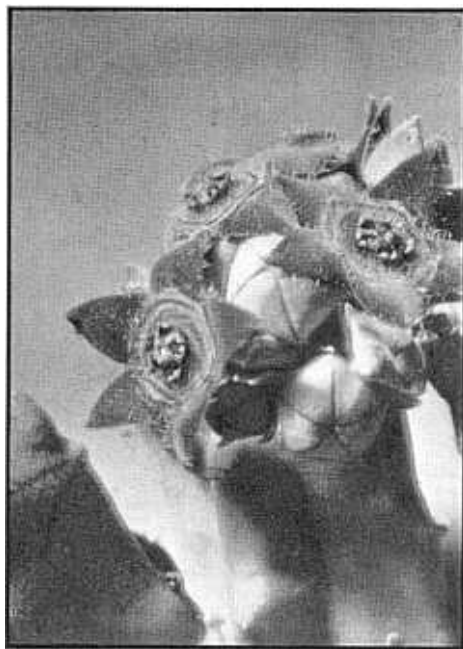


FIG. 165

Caralluma europaea var. *simonis* Berger x 2.
Photo by James West.

"Simon's variety" (we do not know the why and wherefore of the name) is the common variety of *Caralluma europaea* throughout Algeria and Tunis. The flowers have a more hairy appearance than those of the type, for they are more heavily ciliate and the hairiness around the corona on the disk is heavier. The lobes are somewhat

broader than those in the type or in the other varieties, and they are more or less recurved. The corolla shows less of the yellowish-green ground-color, for the lobes are wholly purple-brown and the disk is much obscured by the concentric purple-brown arc-like markings.

Var. c. *Caralluma europaea* var. *maroccana* (Hooker fil.) Berger, Stap. und Klein., 96. 1910.

Boucerosia maroccana Hooker fil., Bot. Mag., t. 6137. 1874.

Caralluma maroccana N. E. Brown, Gard. Chron., xii. 370. 1892.

Caralluma maroccana var. *confusa* Sennen et Mauricio, Cat. Flora Rif Orient., 77. 1933.

(Description summarized from that by A. Berger, l.c.):

Corolla: somewhat larger than in the type; disk and base of lobes purple-brown with a few yellow concentric bands and somewhat hairy, upper part of the lobes entirely purple-brown and glabrous; lobes not ciliate, usually somewhat bent inwards;

Outer corona: with the knobs on the lobes borne on small stalks, which are about twice as long as the knob themselves.

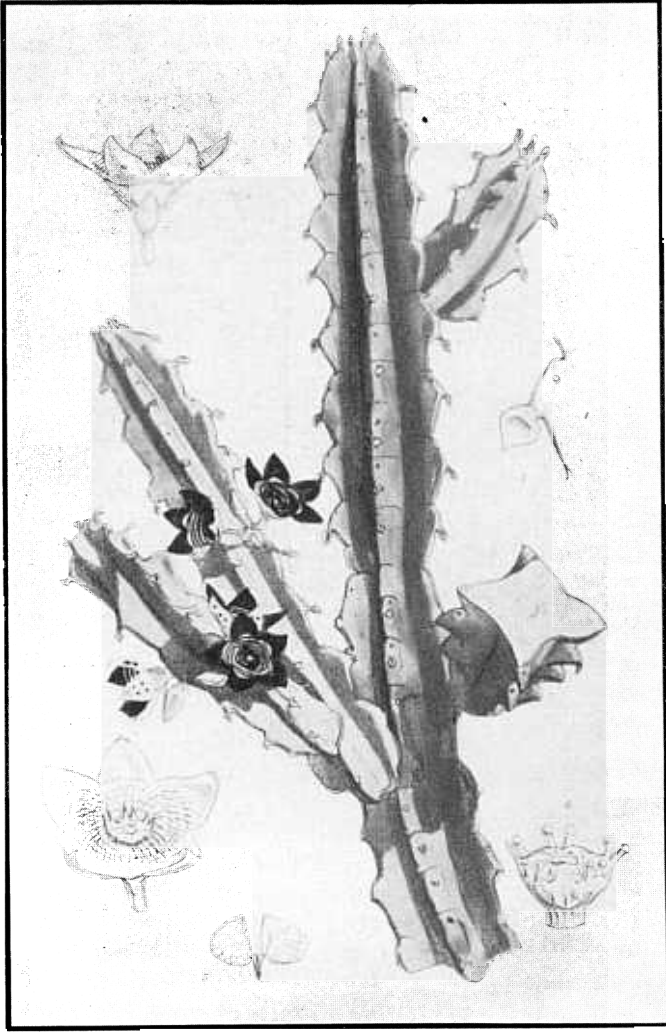


FIG. 166

Caralluma europæa var. *maroccana* Berger

From a drawing by W. H. Fitch in Curtis's Botanical Magazine, 187.

Type locality: Morocco: on rocky islands and along the coast near Mogador.

Distribution: Southern Morocco.

The "Morocco variety" of *C. europæa* was collected by Sir Joseph D. Hooker in south-westerly Morocco in May, 1881. It is frequent in south Oran, where the natives eat the stems raw. The flowers differ from the type in not being ciliate and in having the knobs on the outer corona-lobes raised aloft on short stalks. The corolla, as a whole, is not as dark as that of the var.

simonis. Fig. 167 represents a curious form of this variety, collected by Prof. Barruel and Jean Gattefossé in the Forest of Adimine in southern Morocco in May, 1934. This plant grows vertically to a height of 2 feet, supporting itself on the branches of *Periploca laevigata*, an arborescent Asclepiad abundant in this forest.



FIG. 167

Caralluma europaea N. E. Brown. Form related to the var. *maroccana*.
Photo by Gattefossé and Barruel.

Var. d. *Caralluma europaea* var. *affinis* (de Wildeman) Berger, Stap. und Klein., 97. 1910.

Caralluma affinis de Wildeman, Icon. Select. Hort. Then., v. t. 107. 1904.

Caralluma maroccana Berger, Monatsschr. Kakt., xiv. 5. 1904. *Nec* N. E. Brown, 1892.

(Description summarized from that by A. Berger, l.c.):

Stems: stronger than in the type, up to $2\frac{1}{2}$ cm. thick;

Flowers: more numerous, up to 16 together;

Pedicel: longer, 3 to 4 mm.;

Corolla: 16 to 19 mm. in diameter, slightly bent back at the tips of the lobes; coloring as in the type, but the circular stripes larger; *disk* with a very few colorless hairs, visible with a lens; *lobes* not ciliate;

Outer corona: lobes with the knobs sessile.

Type locality: Unknown.

Distribution: Unknown.



FIG. 168

Caralluma europaea N. E. Brown x 1.5. A form related to the var. *affinis* Berger.

The "kindred variety" of *C. europaea* has the largest flowers of any form of the species, and they are the least hairy. They are not ciliate and the few hairs which persist on the disk around the corona are hardly visible save with a lens. The variety is a variable one, and Dr. Maire writes us that he has found no specimens agreeing exactly with the description, which may have been based on a garden hybrid. We have had an interesting flower in our collection, which is intermediate between this var. *affinis* and the var. *simonis* (see Fig. 168).

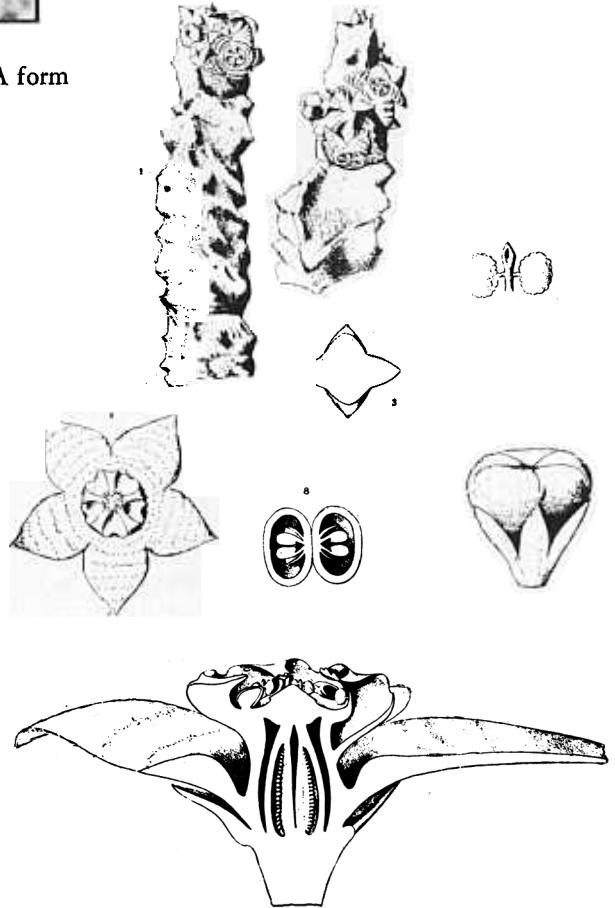


FIG. 169

Caralluma europaea var. *affinis* Berger
5. Flower x 1.5

Drawing by A. d'Aprial in de Wildeman:
Icon. Select. Hort. Then., 1904.

Var. e. *Caralluma europaea* var. *confusa* (Font Quer) Font Quer, Mem. Mus. Cienc. Nat. Barcel., No. 2. 10. 1924.

Stapelia europaea Webb, Iter Hisp., 29. 1838. *Nec* Gussone, 1832.

Apteranthes gussoneana Boissier, Voy. Bot., 411. 1839-45. *Nec* Mikan, 1835.

Boucerosia munbyana var. *hispanica* Jiménez et Ibanez, Mem. Prim. Cong. Nat. Esp., 262. 1909. *Nec* de Coincy, 1898.

Caralluma confusa Font Quer, Bull. Inst. Cat. Hist. Nat., 31. 1922.

(Description based on that by Dr. P. Font Quer, Mem. Mus. Cienc. Nat. Barcel., l.c., translated from the Catalan):

Corolla: up to 17 mm. in diameter; *lobes* broadly triangular, not as deeply cleft as in the type, ciliate;

Outer corona: bowl-shaped at the base, then produced into 5 deeply bifid lobes, without the terminal knobs characteristic of the type;

Otherwise as in the type.

Type locality: Spain: Capo de Gata, near Almeria.

Distribution: Also from Province of Murcia: near Mazarron.

The "confused variety" of *C. europaea* well deserves its name, for it was misidentified three times prior to its correct classification by Dr. P. Font Quer, Director of the Museu de Ciencies Naturals of Bar-

celona. It was first discovered by Philip Barker Webb, an English traveler in Spain, in 1826, six years prior to the collection of the type by Gussone. In his account of his trip to Spain (Iter Hispaniense, 1838), Webb relates that the botanist La Gasca had told him of the existence of a *Stapeliad* plant in Spain, which La Gasca himself had not seen. Upon finding the plant, Webb anticipated Gussone by coining the name *Stapelia europaea*, which he wrote on his herbarium sheets; but he did not publish the name formally, so that the plant collected by Gussone on the island of Lampedusa has become the type of the species. Webb supposed his plant to be identical with Gussone's, overlooking the important difference in the outer corona structure. So also did Boissier, who named the plant *Apteranthes gussoneana*, adopting Mikan's synonym for Gussone's plant. The genus *Apteranthes* had been established on the very feature in Gussone's plant which Webb's variety did not possess, the little terminal knobs of the outer corona-lobes. Contrasted with Gussone's plant, Webb's was not an *Apteranthes* at all. This, however, Boissier and several botanists who followed him wholly failed to see. Many years later the Spanish botanist, Jiménez

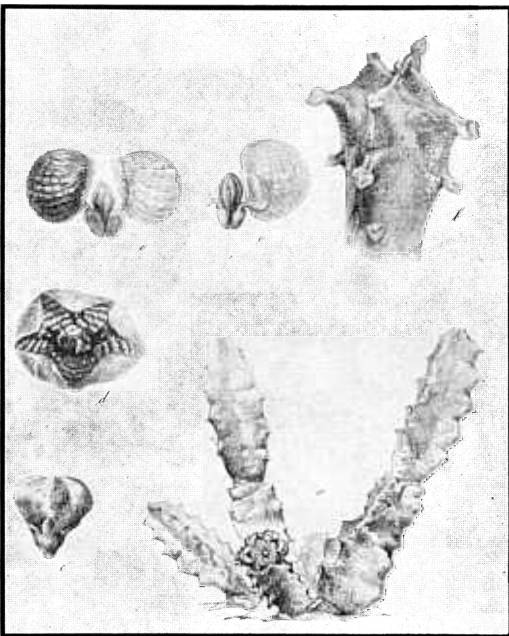


FIG. 170

Caralluma europaea var. *confusa* Font Quer
d. Flower x 1.25

Drawing by I. de Sagarra, from Memories del Museu de Barcelona, 1924.

Munuera, who collected the plant further north than Webb had found it, recognized to his great surprise that it was not an *Apteranthes*, but he in turn went astray by considering it as a variety of *Caralluma* (*Boucerosia*) *munbyana*. When Dr. Font Quer finally realized the true nature of the plant, he felt the difference in the corona to be so distinctive, as compared with Gus-

sone's type form, that he referred it to a new species, which he christened *C. confusa*. It was not till 1924 that he decided to place it as a variety of *C. europaea*, from which after all it differed little except in the corona. The local name of the variety is *Chumberillo de lobo*, or "little Wolf Cactus."

31. *Caralluma munbyana* (Decaisne) N. E. Brown, Gard. Chron., xii. 278. 1892.

Boucerosia munbyana Decaisne, Munby: Flor. Alg., 25. 1847.

(Description by J. Decaisne, l.c., translated from the Latin):

Stems: erect, 4-angled; leaves ovate, acute, glabrous;

Flowers: 5 to 10 together in fascicles at the apex of the stems, sessile;

Corolla: brown; lobes linear;

Follicles: extremely long, inflexed at the apex.

Type locality: Algeria: Misserghia, 10 miles from Oran.

Distribution: On rocks in Santa Cruz; and very abundant on rocks overlooking the sea from Mers-el-Kebir to Falcon Cape, Oran.

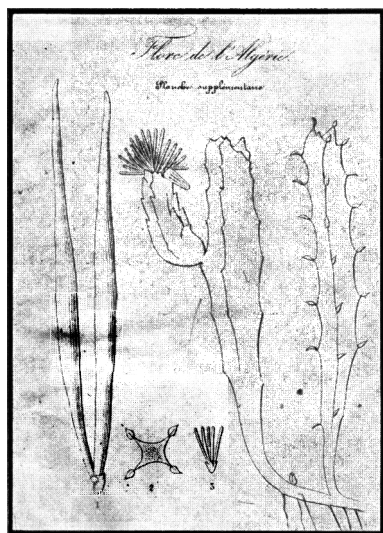


FIG. 171

Caralluma munbyana N. E. Brown x 0.5

Drawing by G. Munby from Flore de l'Algérie, 1847.

"Munby's *Caralluma*" was discovered by Giles Munby near Oran in Algiers prior to 1847. The "Spanish variety," var. *hispanica*, grows in Morocco as well as in southern Spain. It is the second *Caralluma* known from Europe. The stems of the type plants are more or less grooved between the angles; and the angles are saw-

toothed. The flowers form sessile clusters of 4 to 10 near the tips of the stems. They are entirely brown and glabrous, with a very short central tube and the $\frac{1}{4}$ -inch corolla-lobes deeply cleft, their slenderness emphasized by the fact that the lateral edges roll back. The corona consists of erect bifid outer corona-lobes alternating with the short inner corona-lobes, which are incumbent on the anthers and not produced above them. The flowers open in September and have the reputation of being very ill-smelling. The seeds ripen in the spring. The young stems are eaten by the native Arabs and by goats.

The exact relationship of the var. *hispanica* to the type has not been accurately defined. De Coincy states that in the variety all the stem teeth are accompanied by an axil, so that new stems may develop at all points and occasionally be opposite one to another, whereas in the type the axils are found only at every second tooth, so that the stems must always be alternate or otherwise irregularly disposed. The stems themselves are thicker in the type, the angles more compressed, the leaves slightly longer; and in the flowers the corona-lobes are longer and more closely intergrown.

Var. a. *Caralluma munbyana* var. *hispanica* (de Coincy) Maire, Bull. Soc. Hist. Nat. Afr. Nord., xv. 388. 1924.

Boucerosia munbyana var. *hispanica* de Coincy, Journ. de Bot., 250. 1898.

Boucerosia hispanica de Coincy, Journ. de Bot., 336. 1899.

(Description based on that by A. de Coincy, Journ. de Bot., 336. 1899.

Translated from the French):

Stems: often making underground growth; aerial stems elongated, 10 to 20 cm. long, succulent, glaucescent, 4-angled; angles sinuous, indistinctly toothed; teeth terminating in minute transient alternately-opposite sessile trowel-shaped leaves, above each of which is located a binate stem-axil;

Flowers: in small fascicles at the apex of the stems from the sides between the angles;

*Pedice*l: very short;

Sepals: lanceolate, acute, greenish;

Corolla: in bud valvate-reduplicate; when expanded 6 to 8 mm. in diameter, fleshy, subcampanulate; lobes erect-diverging, linear, narrowing from the base, the apex mucronate, the margins reflexed, not ciliate, velvety, reddish-brown inside, much paler outside, whitish at the base;

Outer corona: lobes bifid in two triangular segments, acute, erect, much shorter than the inner corona-lobes and alternating with them, purplish-black;

Inner corona: lobes triangular, incumbent and appressed upon the anthers, reddish-brown;

Staminal column: with the anthers appressed on the style apex; anthers without a terminal appendage; *pollen-masses* erect, horizontal, attached in pairs by a blackish-brown caudicle;

Follicles: in pairs, or sometimes single or unequal through abortion, erect, about 8 cm. high, fusiform, acuminate to an uncinat point; *seeds* ovate, thickened at the margin, 6 mm. long not including the long silky terminal tuft of hair which is 2 to 2.5 cm. in length.

Type locality: Spain: Prov. of Murcia: near Caravaca, on the mountain called "Calar de mina" at 1500 ft. elevation.

Distribution: Also from Morocco: Mt. Oudjda, chalk rocks of Djebel Hamri, at 2500 ft. elevation.



FIG. 171-A

Giles Munby.

From the Gardeners' Chronicle.

32. *Caralluma oxyodonta* Chiovenda, Flora Somala II, 298. 1932.

(Description by Prof. E. Chiovenda, l.c., translated from the Latin):

Stems: succulent, rooting horizontally at the base; 10 to 15 cm. long, erect, 4-angled, branching along the upper portion; branches deeply grooved, sometimes more or less in spirals, the bottom of the grooves subacute-angled, the angles rising as plates 6 to 7 mm. high and 1 to 1.5 mm. thick, with whitish-cartilaginous edges and rather obtuse conical spreading whitish-cartilaginous teeth, otherwise in the dried state ashy-blackish in the grooves;

Flowers: about 12 in a subglobose umbel 4 to 5 cm. in diameter at the apex of the branches, more or less deflexed;

*Pedice*l: short, stout, 2.5 to 3 mm. long, 1.5 to 2 mm. thick, longitudinally slightly grooved, glabrous;

Sepals: linear-lanceolate, fleshy, rigid, erect, 3.5 to 4 mm. long, 1.25 to 1.5 mm. wide at the base, gradually attenuate-acute, glabrous;

Corolla: campanulate, about 2 cm. long and 1.5 cm. in diameter; at the base yellowish, deeply blackish-purple above, constricted at the bottom of the tube into a small cylinder 1.5 to 2 mm. long and equally wide; lobes ovate-oblong, scarcely acute at the apex and without a tuft of brush-like hairs, about 10 mm. long and 5 to 6 mm. wide; glabrous throughout inside and out, but the lobes ciliate along their entire margins with thick clavate erect hairs, 1 to 1.5 mm. long, spreading when dry and appressed against the lobes when moist;

Outer corona: lobes lanceolate-acuminate, glabrous, erect, about 1.5 mm. long and 0.3 mm. broad, exceeding the staminal column by $\frac{1}{3}$ to $\frac{1}{2}$, with the edges sloping down against the sides of the staminal column so as to form five sinuses there;

Inner corona: lobes triangular, glabrous, appressed upon the anthers, adnate at the sides and base to the outer corona-lobes, forming along the radial lines an erect wing-like projection broadening in the direction of the circumference.

Type locality: Italian Somaliland: Oltregiuba district: near Afmadú.

Distribution: Not further known.

The "sharp-toothed *Caralluma*" was discovered in 1926 by Dr. Pompeo Gorini in the extreme south of Italian Somaliland, below the River Juba. The flowers somewhat resemble those of the *C. retrospiciens*

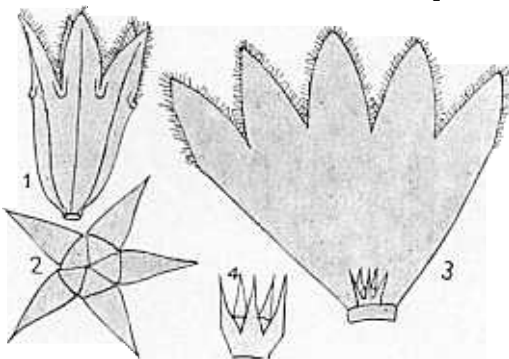


FIG. 172

Caralluma oxyodonta Chiovenda (1) x 1.3

From E. Chiovenda: Flora Somala II, 1932.

group, in forming terminal umbels of blackish-purple individuals, but the differences are very marked. For the flowers have a yellowish zone at the lower part of the tube, and the whole shape of the corolla is much more prominently campanulate than in any variety of *C. retrospiciens*. The outer corona-lobes terminate in a single acute tooth, which contrasts with the deeply bifid structure of the outer corona-lobes in the entire *C. retrospiciens* group. It is from this feature that the species gets its name. It differs from *C. edithae* in the absence of the characteristic brush-like tuft of hairs at the apex of the corolla-lobes. It differs from *C. speciosa* in the smaller flowers and the coloring of the corolla, not to mention again the distinctive form of the outer corona-lobes.

33. *Caralluma edithae* N. E. Brown, Kew Bull., 219. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 481):

Plant: robust, bushy, succulent, glabrous in all parts except the corolla; *stems* acutely 4 (rarely 5)-angled, 1 in. or more thick; angles with broad deltoid teeth having horizontal or more or less deflexed indurated points;

Flowers: in umbels of 60 to 70; umbels terminal, sessile, globose, about $2\frac{1}{2}$ in. in diameter;

*Pedice*l: 9 lin. long;

Sepals: $2\frac{1}{2}$ to 3 lin. long, linear-subulate, attenuate to a fine point, strongly revolute at the apical part;

Corolla: about $\frac{1}{2}$ in. in expanse, glabrous and smooth outside, tuberculate-rugose within, with a tuft of long purple vibratile hairs at the apex of each lobe, otherwise quite glabrous and not ciliate, dark purple-brown; *tube* short, campanulate, about $1\frac{1}{2}$ to $1\frac{3}{4}$ lin. long, 3 lin. in diameter outside; *lobes* about $2\frac{1}{2}$ lin. long and the same in breadth at the base, more or less spreading, deltoid-ovate, acute, slightly hooked at the tips;

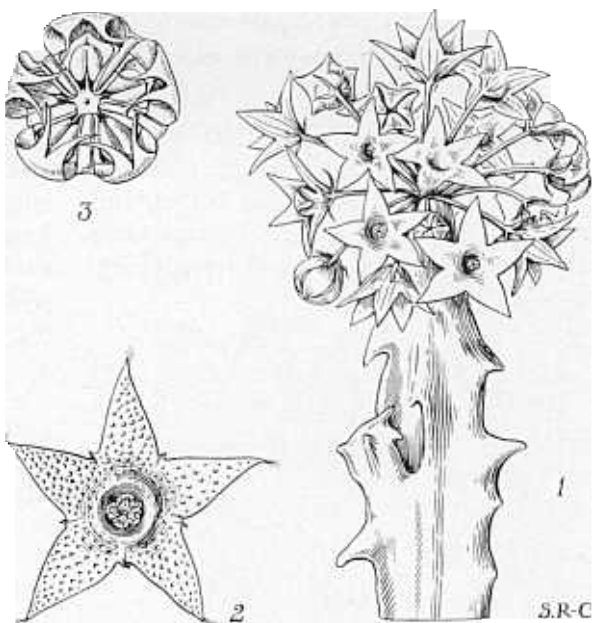
Outer corona: arising from the base of the staminal column, glabrous, cup-shaped, with 5 erect lobes $\frac{1}{2}$ to $\frac{3}{4}$ lin. long, deeply bifid, their subulate segments contiguous at their base, then divergent-arcuate; cupular part of the corona reaching to the same level as the top of the staminal column;

Inner corona: lobes $\frac{1}{2}$ lin. long, linear, obtuse, incumbent on the backs of the anthers and not or scarcely exceeding them, dorsally adnate to the outer corona, glabrous.

Type locality: British Somaliland: without precise locality.

Distribution: Not further known.

"Edith's *Caralluma*" is another giant African species, named for its discoverer, Miss Edith Cole, who collected it in British Somaliland about 1895. The flowers are a $\frac{1}{2}$ -inch or more in diameter, blackish-purple, and form in terminal umbels of 60 to 70 flowers. They are closely related to the Arabian *Caralluma penicillata* and like that species bear tufts of long vibratile purple hairs at the tips of the corolla-lobes. They differ from *C. penicillata* in the form of the outer corona-lobes, which are deeply bifid, instead of being nearly truncate.



2. Corolla x 2.

3. Corona x 8.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

FIG. 173

Caralluma edithae N. E. Brown x 1

34. *Caralluma somalica* N. E. Brown, Kew Bull., 264. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 482):

Stems: apparently acutely 4-angled, glabrous; angles slightly toothed;

Flowers: very numerous, in a terminal globose umbel about 2 in. in diameter;

*Pedice*l: 6 to 8 lin. long, glabrous;

Sepals: $1\frac{1}{2}$ to 2 lin. long, lanceolate-attenuate, with a few minute hairs on the back;

Corolla: 6 to 7 lin. in diameter; *tube* short, campanulate, enclosing the corona; *limb* rotate, 5-lobed to half-way down; *lobes* $2\frac{1}{2}$ lin. long, 2 lin. broad, deltoid-ovate, acute, quite glabrous outside, with a very minutely velvety surface within, not ciliate;

Outer corona: lobes arising $\frac{3}{4}$ lin. above the base of the staminal column, somewhat spreading, $\frac{1}{2}$ lin. long, deltoid-oblong, terminated by two divergent subulate teeth about $\frac{1}{2}$ lin. long, which sometimes have a minute tooth between them, minutely and sparsely hairy on the back;

Inner corona: lobes about $\frac{1}{3}$ lin. long, linear, incumbent on the backs of the anthers and not exceeding them;

Staminal column: 1 lin. long; *anthers* subquadrate, not appendaged.

Type locality: Italian Somaliland: near Mogadoxo.

Distribution: Not further recorded.

The "Somaliland *Caralluma*" was brought from the southern part of Italian Somaliland by Sir John Kirk about 1887. It is an imperfectly known species, with $\frac{1}{2}$ -inch flowers borne in large terminal clusters, two or three inches in diameter. Their color is not stated. They are distinguished from the flowers of the other umbellate species by being velvety-pubescent on the inner corolla surface, not tuberculate, and without any long hairs or ciliation. The description states that the outer corona-lobes have two divergent teeth, but Miss Ross-Craig, in preparing her drawing, found that only one of three coronas dissected by her had the outer corona-lobes bidentate, while two had tridentate lobes as shown in the figure.

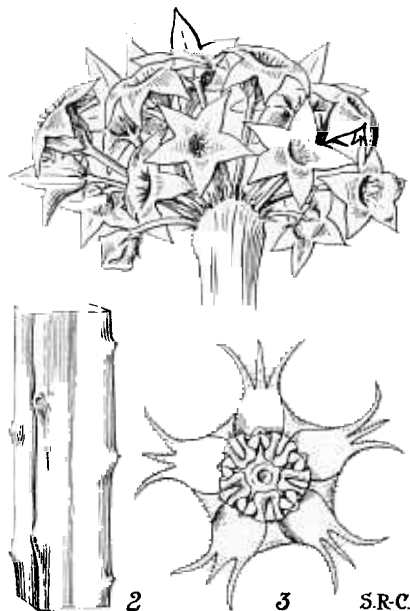


FIG. 174

Caralluma somalica N. E. Brown

1. Terminal umbel x 1.
2. Section of stem x 2.
3. Corona x 6.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

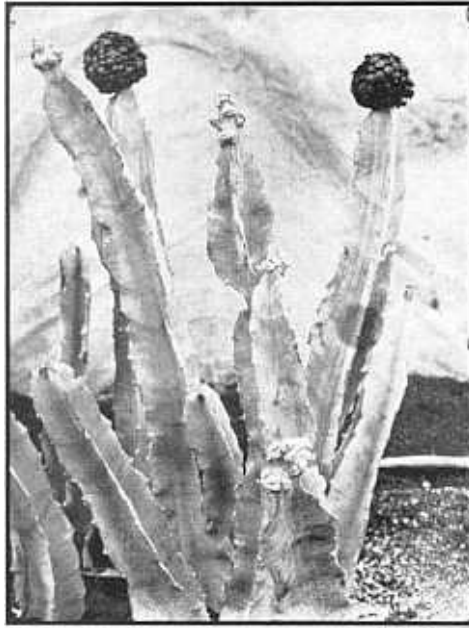


FIG. 175

Caralluma retrospiciens N. E. Brown x 0.1

Photo by R. H. Pulleine.

35. *Caralluma retrospiciens* (Ehrenberg) N. E. Brown, Gard. Chron., xii. 370. 1892.*Desmidorchis* sp. Ehrenberg, Linnaea, 94. 1829.*Desmidorchis retrospiciens* Ehrenberg, Abh. Acad. Berlin, 33. 1831.*Boucerosia russeliana* Courbon, Bull. Soc. Bot. Fr., vii. 900. 1860.*Caralluma respiciens* K. Schumann, Engler & Prantl: Pflanzenfam., iv. ii. 278. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 480):

Stems: $1\frac{1}{2}$ to 2 ft. high, branched, very stout, acutely 4-angled; angles much compressed, about $\frac{3}{4}$ in. broad, with broad deltoid decurved teeth, glabrous;*Flowers*: in terminal umbels; umbels sessile, usually several clustered together, forming a large compound globose umbel 3 to 4 in. in diameter, with a hundred or more flowers;*Pedice*l: $\frac{3}{4}$ to $1\frac{1}{2}$ in. long; glabrous;*Sepals*: 1 to $2\frac{1}{2}$ lin. long, lanceolate-attenuate, with a few minute hairs on the back;*Corolla*: 6 to 8 lin. in diameter, rotate, 5-lobed to half-way down, blackish-purple; lobes $2\frac{1}{2}$ to 3 lin. long and the same in breadth, broadly deltoid-ovate, acute, glabrous on the back, rugulose, sparsely covered with long purple hairs or sometimes glabrous on the inner face, ciliate with similar vibratile hairs;*Outer corona*: arising $\frac{1}{2}$ lin. above the base of the staminal column, cup-shaped, with 5 pairs of diverging-arcuate subulate teeth $\frac{1}{2}$ to $\frac{3}{4}$ lin. long, more or less pubescent, purple-brown; the two teeth belonging to each of the 5 united lobes that form the cup rather wide apart at the base, and sometimes with a minute tooth between them;*Inner corona*: lobes linear, obtuse, incumbent on the backs of the anthers and not exceeding them, dorsally adnate to the outer corona, purple-brown;*Follicles*: 5 to 6 in. long, 3 to 4 lin. thick in the dried state, apparently subterete, acuminate, erect and subparallel; *seeds* 5 lin. long, 3 lin. broad, deeply channelled down the face, from the broad margins being strongly incurved, smooth, glabrous, brown.

Type locality: Red Sea: Dahlac Island.

Distribution: Also from many points in the Sudan; Red Sea Islands; Eritrea; Ethiopia; and British Somaliland.

The honor of having discovered *Caralluma retrospiciens* belongs to the famous German naturalist, Dr. Christian Gottfried Ehrenberg, who collected it in 1820 on Dahlac Island in the Red Sea. It has since been found at many points on the easterly tooth of the African continent, from the Kassala province of the Sudan to Ethiopia and Somaliland. In the Sudan the plant is known by the Hadendowa (the fine type of Arab of the Red Sea hills, immortalized in Kipling's poem as the "Fuzzy-Wuzzy") as *Kareib*. Its varieties extend far to the west and south. They are not yet very clearly defined and are linked by intermediate modifications. The most impor-

tant is the var. *tombuctuensis*, which is widely represented in many sections encircling the great Sahara Desert. Together with the varieties, *C. retrospiciens* spans some four thousand miles of territory across the heart of northern Africa. And everywhere it appears as a mammoth among Stapeliads, forming clumps six feet and more in diameter and, in the var. *tombuctuensis*, attaining a height of over four feet. The stems are very stout, the compressed angles hav-

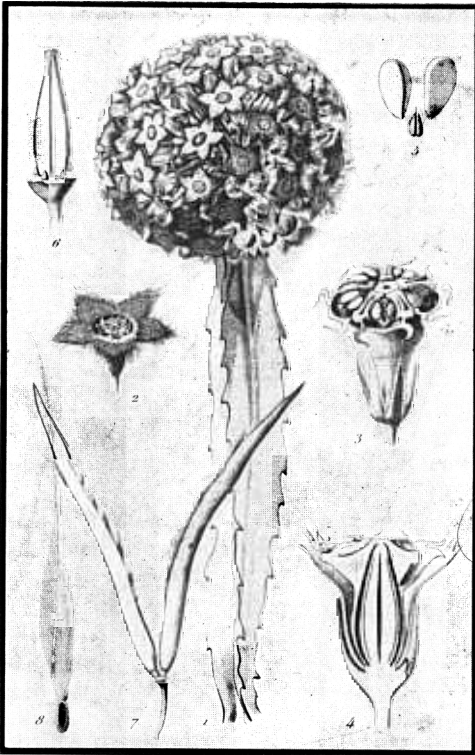


FIG. 176

Caralluma retrospiciens N. E. Brown x 0.25
From Annales des Sciences Naturelles, 1862.



FIG. 177

Seedlings of *Caralluma retrospiciens*
N. E. Brown

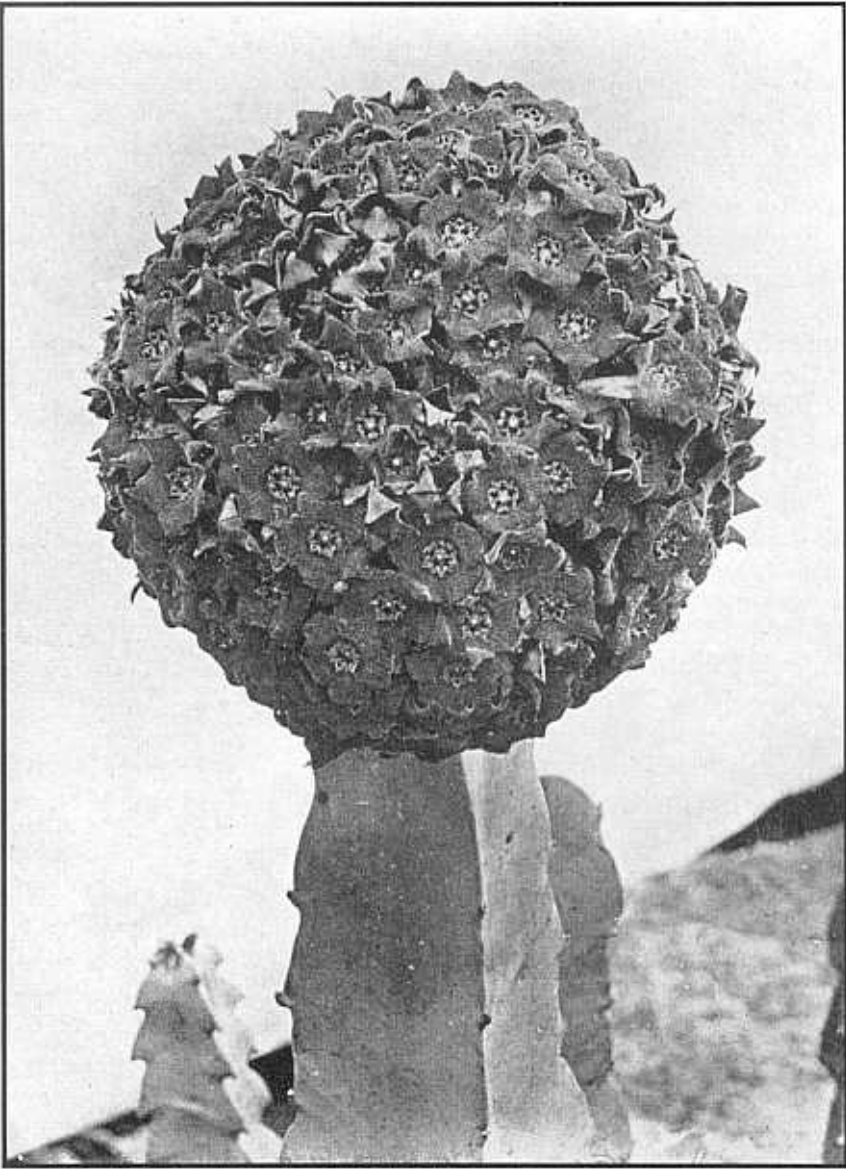


FIG. 178

Caralluma retrospiciens (var. *glabra*?) N. E. Brown x 1.

Flowering stem from Kenya. Note fly alighting on flower at right of centre.

Photo by Mrs. E. R. Molony.

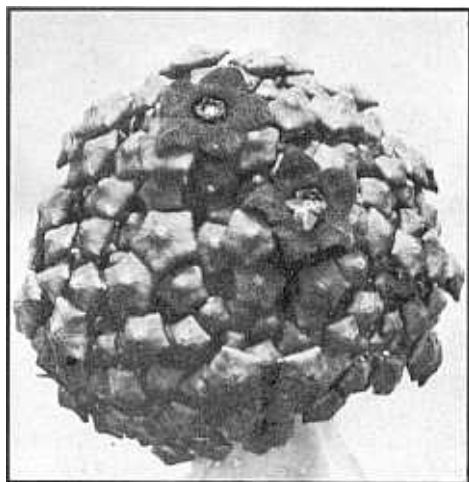


FIG. 179
Caralluma retrospiciens N. E. Brown x 0.5
Photo by R. H. Pulleine.

the lobes fringed with similar vibratile hairs. *C. retrospiciens* has been called an evil-looking and evil-smelling plant, but it remains a great prize for collectors, as it is difficult to grow, either from cuttings or from seeds, and its commanding interest well rewards the efforts necessary to establish it.

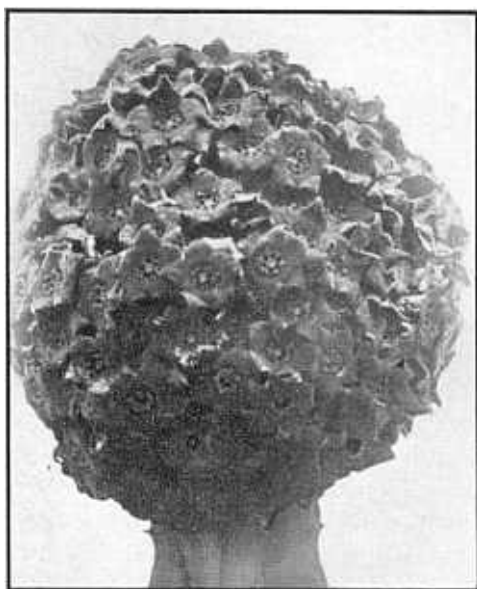


FIG. 180
Caralluma retrospiciens (var. *glabra*?)
N. E. Brown x 0.7
Photo by Dr. A. J. Jex-Blake, from the flower-cluster of a plant from the northern frontier province, Kenya.

ing broad deltoid teeth, and it is from the circumstance that in the type these quite generally point downwards, like powerful fish-hooks, that the plant gets its name, the "backward-pointing *Caralluma*." The flowers form large compound terminal umbels, great balls four inches or more in diameter, comprising 100 or 200 individual flowers. Single flowers are about $\frac{2}{3}$ inches in diameter in the type and twice as big in the var. *hirtiflora*. They are blackish-purple, sparsely covered in the type with long purple hairs on the inner corolla face,

Var. a. *Caralluma retrospiciens* var. *glabra* N. E. Brown, *Flora Trop. Afr.*, iv. i. 481 1904.

Type locality: Kenya: Witu.

Distribution: Probably from several points in Kenya.

The "glabrous variety" is identical with the type, except that the corolla is glabrous within and not ciliate. It should be noted that the var. *tombuctuensis* is also stated to be glabrous on the corolla-lobes. The var. *glabra* was discovered by Thomas, near Witu on the Tana River in Kenya, and it appears to be the plant collected at several points in Kenya. This is the most southerly

locality recorded for the entire species and the only one south of the Equator. "This *Caralluma*," Lady Muriel Jex-Blake writes us from Nairobi, "is the color of the best stewed prunes, almost black, with a touch of purple in it—most attractive—and the head of flowers is about the size of a slightly small tennis ball."

Var. b. *Caralluma retrospiciens* var. *hirtiflora* (N. E. Brown) Berger, Stap. und Klein., 71. 1910.

Caralluma hirtiflora N. E. Brown, Kew Bull., 264. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 480).

Stems: not seen, stated on the label to be "very thick, fleshy, square;"

Flowers: in a rough sketch are shown to be in large terminal umbels;

*Pedice*l: 1 in. or more long, glabrous;

Sepals: $1\frac{1}{2}$ to 2 lin. long, lanceolate-attenuate, with a few minute hairs on the back;

Corolla: rotate, 5-lobed to half-way down, glabrous outside, ciliate and densely covered inside with long purple persistent hairs; *lobes* 3 to 5 lin. long, $2\frac{1}{2}$ to $4\frac{1}{2}$ lin. broad, deltoid-ovate, acute;

Outer corona: arising at the base of the staminal column and as long as it, cup-shaped, with 10 subulate teeth 1 lin. long, and often with a minute tooth between each pair, hairy and more or less ciliate;

Inner corona: lobes $\frac{1}{3}$ lin. long, linear, incumbent on the backs of the anthers and not produced beyond them, dorsally connected to the outer corona by narrow partitions, glabrous;

Staminal column: 2 lin. long; *anthers* subquadrate, obtuse, without an appendage, incumbent on the truncate apex of the style.

Type locality: Red Sea: Harnish Island.

Distribution: Also from Eritrea: near Saati.

The "shaggy-flowered variety" of *C. retrospiciens* was discovered by Slade on Harnish Island in the Red Sea, and is also known from Eritrea. The specimens from Harnish Island have the flowers twice as large as those of the type and very much more hairy within. In the specimens from Eritrea the flowers are smaller again (in the dried state), but still densely covered with persistent hairs inside. Prof. Schweinfurth said the native name of the plant in Eritrea was *Ango harmas*.

Var. c. *Caralluma retrospiciens* var. *tombuctuensis* (Chevalier), comb. nov.

Boucerosia tombuctuensis Chevalier, Cong. Int. Bot. Paris, 271. 1900.

Caralluma tombuctuensis N. E. Brown, Flora Trop. Afr., iv. i. 622. 1904.

Caralluma retrospiciens ssp. *tombuctuensis* Chevalier, Rev. Bot. Appl., 266. 1934.

(Description by Prof. A. Chevalier, Rev. Bot. Appl., l.c., translated from the French):

Stems: 40 to 80 cm. (or occasionally 1 or even $1\frac{1}{2}$ meters) tall, forming perennial tufts, 50 to 75 cm. in diameter, composed of 8 to 15 rooted and branching stems; stems leafless, pale green or whitish, by reason of a waxy coating on their surface, subquadrangular, 4-angled; 2 of the angles separated by 180° and so laid out on a plane, the other 2 almost perpendicular to the first 2 and so parallel to one another; angles with triangular teeth, ending in straight tips, not bent downward;

Flowers: in subglobose terminal umbels 8 to 10 cm. in diameter, very crowded;

*Pedice*l: 5 to 20 mm. long;

Corolla: funnel-shaped-rotate, 12 to 15 mm. in diameter, blackish-purple; *lobes* rugose and furnished with graceful small mobile jointed appendages, especially along the margins.

Type locality: French West Africa: environs of Timbuctu.

Distribution: Recorded from many points in Mauretania; Senegal; French Sudan; Nigeria; and the Algerian Sahara, up to 6000 feet elevation.

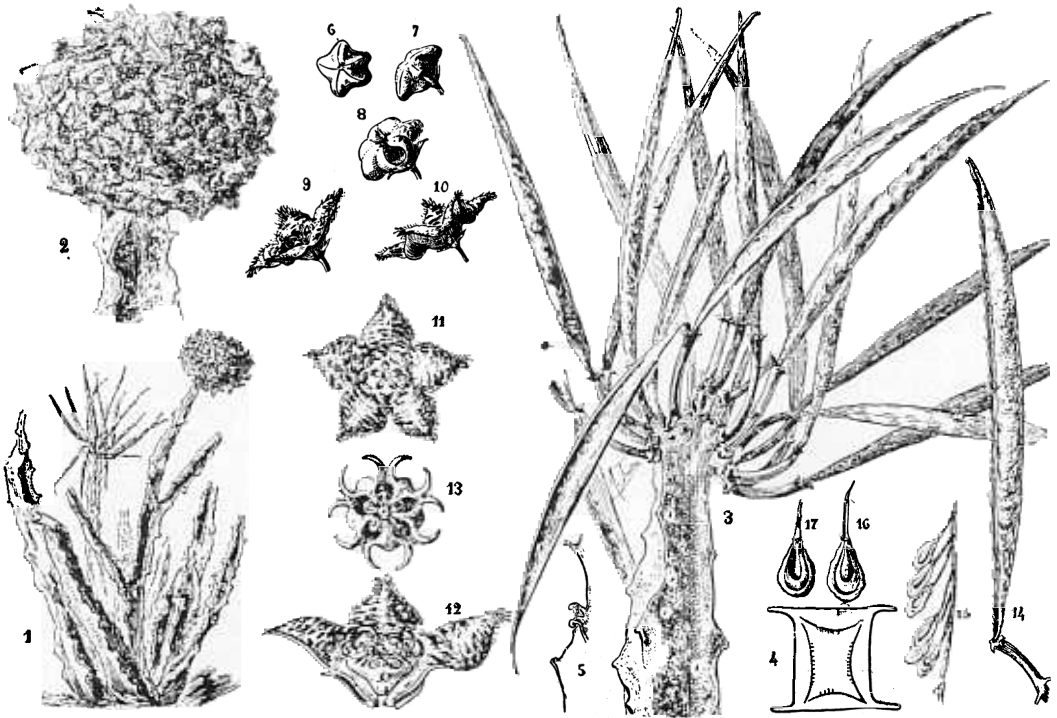


FIG. 181

Caralluma retropiciens var. *tombuctuensis*, comb. nov

From Revue de Bot. Appl., 1934.

The "Timbuctu variety" is the westerly form of *Caralluma retropiciens*, extending across or around the entire Sahara Desert, from the French Sudan on the East to Mauretania and Senegal on the West, and from the Hoggar district in southern Algeria on the North to the Niger on the South. What *C. retropiciens* is to the mimosa zones of north east Africa, the var. *tombuctuensis* is to the Sahelian zones of the west, the great intermediate belts which lie between the fertile lands of the Sudan, etc., and the complete aridity of the inner Sahara. Prof. Chevalier, who discovered it near Timbuctu, first considered it as a distinct species, later making it a subspecies of *C. retropiciens*. Under our system of species and varieties only, it must be looked upon as a variety. The differences from the type are small. The principal distinction is that the teeth on the stem angles are not

turned downward, as in the type, but are usually straight and triangular. But this character is not absolute. Specimens from Gao, in the French Sudan, in the easterly part of the range, have the teeth decurved just as in the type. The flowers differ from those of the type in having shorter pedicels and in the corolla-lobes being glabrous and only papillose. They emit a strong odor of carrion, very popular among the smaller insects. The natives throughout West Africa consider the plant as poisonous. The stems, when cut, exude a sticky greenish watery latex, which is especially avoided and no animals ever touch the plant. The Arab tribe of Habés regard it as having magic properties. Prof. Chevalier has collected a long list of native names in different dialects: *M'Bolla*, *Tidouar*, *Tadenoua*, *Tianga*, *Redjebba*, *Amankett*, *Okoua* and others.

Var. d. *Caralluma retrospiciens* var. *acutangula* (Decaisne), comb. nov.*Desmidorchis acutangula* Decaisne, Ann. Sc. Nat., ix. 265. 1838.*Boucerosia acutangula* Decaisne, de Candolle: Prodrômus, viii. 648. 1844.*Caralluma acutangula* N. E. Brown, Gard. Chron., xii. 369. 1892.*Caralluma retrospiciens* ssp. *tombuctuensis* var. *acutangula* Chevalier, Rev. Bot. Appl., 27. 1934

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 483):

Stems: succulent, triangular; angles acute, very prominent;*Flowers*: many, in terminal umbels;*Pedice*l: short;*Corolla*: lobes smooth outside, densely verrucose and papillose-puberulous within;*Corona*: not described, beyond that "the gynostegium is 20-angular with a few scattered hairs.

Type locality: Senegal: without precise locality.

Distribution: Not further known.

The "acute-angled variety" of *Caralluma retrospiciens* has long been a plant of mystery.

It was discovered by Perrottet during his stay in Senegal, 1824-29, and Decaisne described it as having "acute stems resembling a triangular cactus." The mystery about the plant consists partly in its never having been rediscovered although Senegal has been thoroughly explored botanically during the past century, and partly in the rarity of three-angled stems among the

Stapeliads. Such stems are mentioned in the descriptions of *C. dicapuae*, *C. rivae* and *C. corrugata*. Prof. Chevalier has seen them in rare instances in plants of *C. retrospiciens* var. *tombuctuensis*, and this has led him to regard Perrottet's plant as a variety of the latter, which he in turn considers as a subspecies of *C. retrospiciens*. Pending the possible discovery of new light on the matter, we have placed the plant as a variety of *C. retrospiciens*, next following the var. *tombuctuensis*.

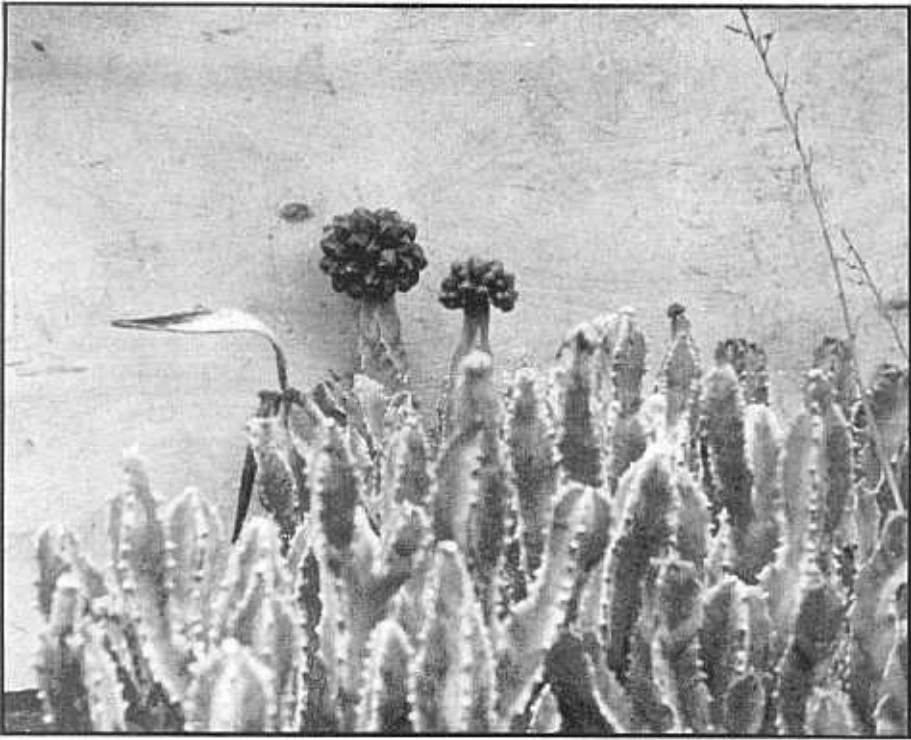


FIG. 182

Caralluma codonoides K. Schumann

Photo by P. R. O. Bally.

36. *Caralluma speciosa* (N. E. Brown) N. E. Brown, Gard. Chron., xii. 370. 1892.

Sarcocodon speciosus N. E. Brown, Journ. Linn. Soc., xvii. 170. 1878.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 479):

Stems: unknown;

Flowers: large, umbellate;

Bracts: 1 to $1\frac{1}{2}$ lin. long, subulate, sparsely covered with minute thick hairs;

Pedicel: 2 to 3 lin. long, stout, glabrous;

Sepals: about $1\frac{1}{2}$ lin. long, lanceolate, acute, with a few minute thick hairs;

Corolla: about $1\frac{3}{4}$ in. in diameter; *tube* large, campanulate, about $\frac{3}{4}$ in. long and broad; *lobes* 6 to 7 lin. long and as much in breadth, spreading, ovate, acute, ciliate with clavate hairs on the revolute margins, otherwise the corolla is entirely glabrous;

Outer corona: lobes spreading, $1\frac{1}{2}$ lin. long, narrowly lanceolate-oblong, bifid to half-way down; teeth parallel;

Inner corona: lobes $\frac{3}{4}$ lin. long, oblong, obtuse, truncate or emarginate, incumbent on the backs of the anthers, which are ascending and reach to the top of the truncately conical apex of the style.

Type locality: Italian Somaliland: near Mogadoxo.

Distribution: Not further known.

The "showy *Caralluma*" is known only from flowers sent to the Royal Botanic Gardens, Kew, by Sir John Kirk in 1875, from near Mogadoxo in southern Ital-

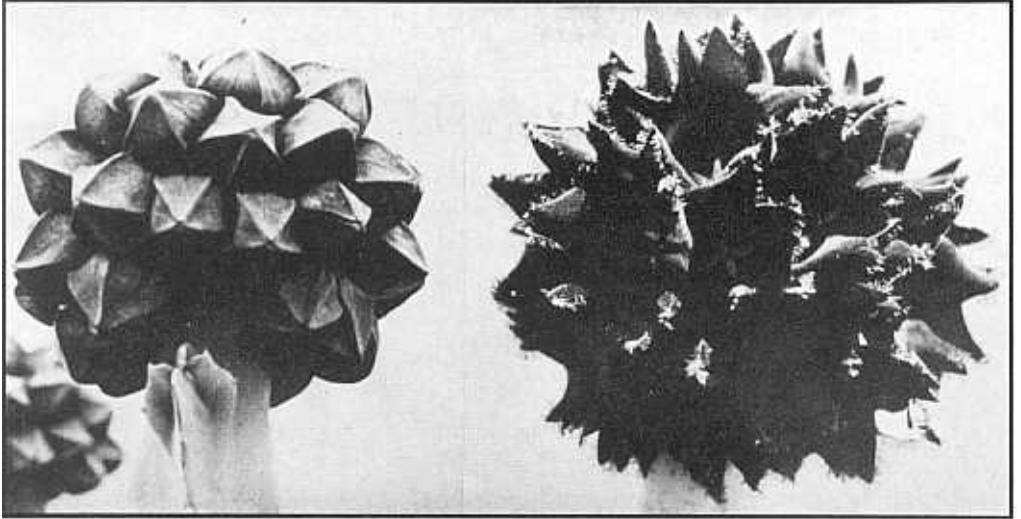
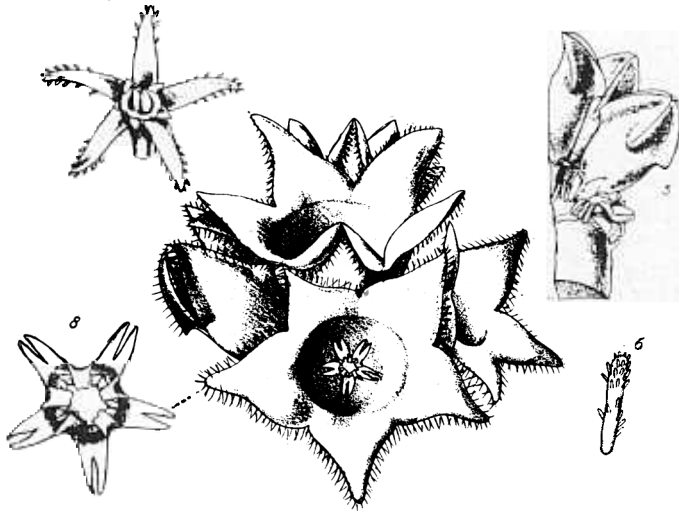
FIG. 183. *Caralluma codonoides* K. Schumann

Photo by P. R. O. Bally of a terminal umbel in bud and another in flower.

ian Somaliland. The flowers (blackish-brown?) are $1\frac{3}{4}$ inches in diameter, being the largest among the tropical species with large terminal umbels. They have a conspicuous corolla-tube, $\frac{3}{4}$ -inch long and broad. From this character Dr. N. E. Brown at first set the species apart in a new genus, *Sarcocodon*, a name derived from two Greek words meaning "Fleshy Bell." Later he transferred the plant to *Caralluma*, be-

cause of the fairly conventional coronal form. But the flower must be a curious one and well worth trying to introduce. There is a plant, discovered by Volkens near Kihurio in Tanganyika, which must be closely similar to *C. speciosa*, though the published description is too imperfect to indicate whether it is identical. This is the "Bell-like *Caralluma*," *C. codonoides*.

FIG. 184. *Caralluma speciosa* N. E. Brown (4) x 0.8

From a drawing by N. E. Brown in Journal of the Linnean Society, 1878.

Caralluma codonoides K. Schumann, Engler: Pfl. Ost.-Afr. C. 328. 1895.

(Description translated by Dr. N. E. Brown, Flora Trop. Afr., iv. i. 480):

Stems: 10 in. high, tetragonal, bearing at the apex a many-flowered umbel of brownish-black flowers, similar in form and size to those of *Campanula trachelium*;

Follicles: about $4\frac{1}{4}$ in. long, glabrous; seeds $4\frac{1}{2}$ lin. long, $3\frac{1}{2}$ lin. broad, broadly margined, adorned with a tuft of hairs nearly 14 lin. long.

Type locality: Tanganyika: Usambara: between Gonja and Kihurio.

Distribution: Not further known.

We have been fortunate to receive three photographs, taken by our collaborator, Mr. Bally, at the type locality, near Kihurio, which should help greatly to determine the precise status of the plant and its relation to *C. speciosa*. See Addenda.



FIG. 185

Caralluma codonoides K. Schumann

Photo by Dr. Walter of a plant in natural surroundings near the type locality, Usambara.

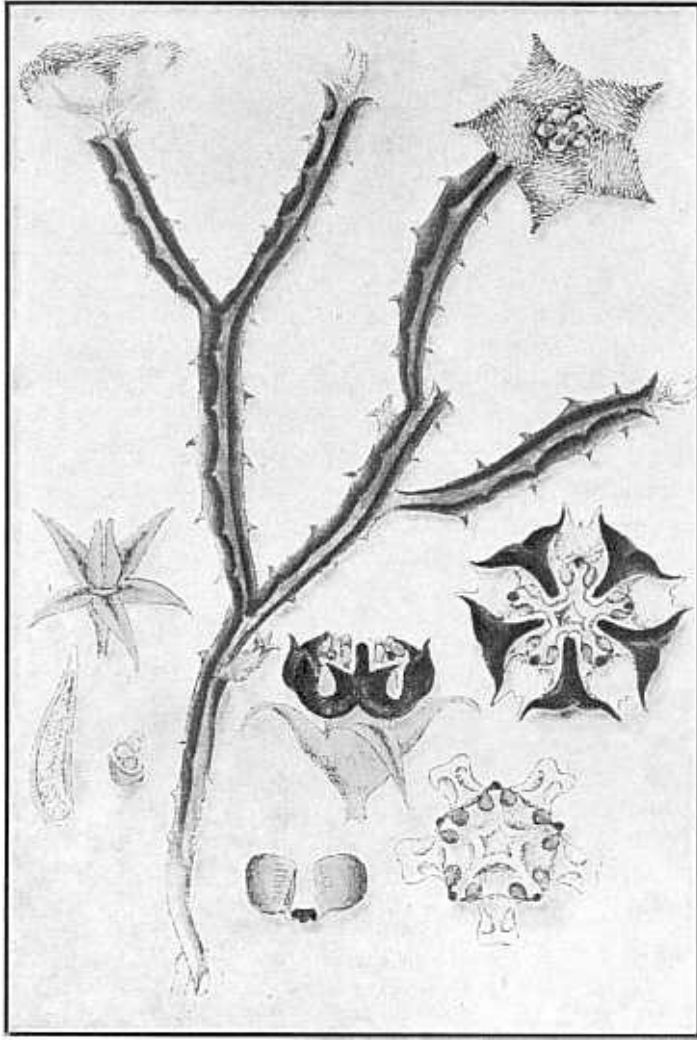


FIG. 186

Caralluma pauciflora N. E. Brown x 1.

Drawing by Rungia. Reproduced by permission of the Director, Royal Botanic Gardens, Kew.

37. *Caralluma pauciflora* (Wight) N. E. Brown, Gard. Chron., xii. 370. 1892.

Boucerosia pauciflora Wight, Contrib. Bot. Ind., 34. 1834.

Desmidorchis pauciflora Decaisne, Ann. Sc. Nat., ix. 266. 1838.

(Description by P. V. Mayuranathan, contributed) :

Plant: small, fleshy, with horizontally spreading underground stems from which arise erect or decumbent shoots; *stems* loosely branching, 4-sided, their corners rounded, rarely over 4 mm. across, 3 to 36 cm. long in extreme cases; leaves deciduous, minute, lanceolate, recurved;

Flowers: in small umbels of 1 to 3; with a strong disagreeable smell;

Corolla: in mature buds conical at the top; when expanded cup-shaped, $2\frac{1}{2}$ cm. in diameter, pale with numerous purple bands inside, covered with purple hairs on the lobes but not on the throat;

Outer corona: lobes whitish with purple tips, arranged in pairs between the inner corona-lobes;

Inner corona: lobes strap-shaped, whitish and somewhat 2-lobed distally, incumbent on the anthers and produced beyond them.

Type locality: India: Madras Presidency: Tinnevely Distr.: near Palamcottah.

Distribution: Also from Pudukkottai State: Pudukkottai; Tirumayam; and Tiruvarangulam; Madura Distr.: Nagamalai; and Alagar Hills.

The "few-flowered *Caralluma*" was discovered by Dr. Wight in the south-eastern part of the Indian Peninsula prior to 1834. Dr. Gravelly and Mr. Mayuranathan have given a very interesting account of the species in their Bulletin on the Indian Species of *Caralluma*, p. 22, from which we quote in part: "The cup-shaped flowers borne singly, or at most in twos and threes, in place of the usual umbel, at once distinguish this species from other Indian *Boucerosias*. Mature buds are conical above with the apex of the cone slightly elevated (Fig. 141: 15). The flowers are rather pale, with the usual concentric purplish markings strongest towards the centre. Hairs are present all over the corolla-lobes, but are absent from the disk. The outer corona-lobes are whitish with purple tips and are arranged as usual in pairs between the inner corona-lobes, which are more or less whitish distally. In Wight's figure the former are nowhere in contact and the latter are rounded distally. In our specimens the

latter are truncate (rectangular) distally and the former, though separated at their bases, invariably bend round so that their apices are in contact. In view of the apparent constancy of many such small characters in particular strains among other species this difference is not likely to be important. It is, however, possible that it may indicate the existence of two local races, for Wight's specimens—including presumably those from which his figures were made—were from the Tinnevely District, whereas ours are from Pudukkottai State and the Madura District. No other records seem to have been made. Flowers appear only during the rains of the north-east monsoon. The stems are about 3 mm. broad. In Madras they never seem to grow more than about 6 cm. high, the plants always having a somewhat stunted appearance. In Pudukkottai, however, they grow more luxuriantly, closely resembling those of *Caralluma indica*."

38. ***Caralluma cicatricosa*** (Defflers) N. E. Brown, Gard. Chron., xii. 369. 1892.*Desmidorchis forskalii* Decaisne, Ann. Sc. Nat., ix. 265, *partim.* 1838.*Boucerosia forskalii* Decaisne, de Candolle: Prodrromus, viii. 648, *partim.* 1844.*Boucerosia cicatricosa* Defflers, Voy. Yemen, 170. 1889.

(Description based on that by A. Defflers, l.c., translated from the Latin) :

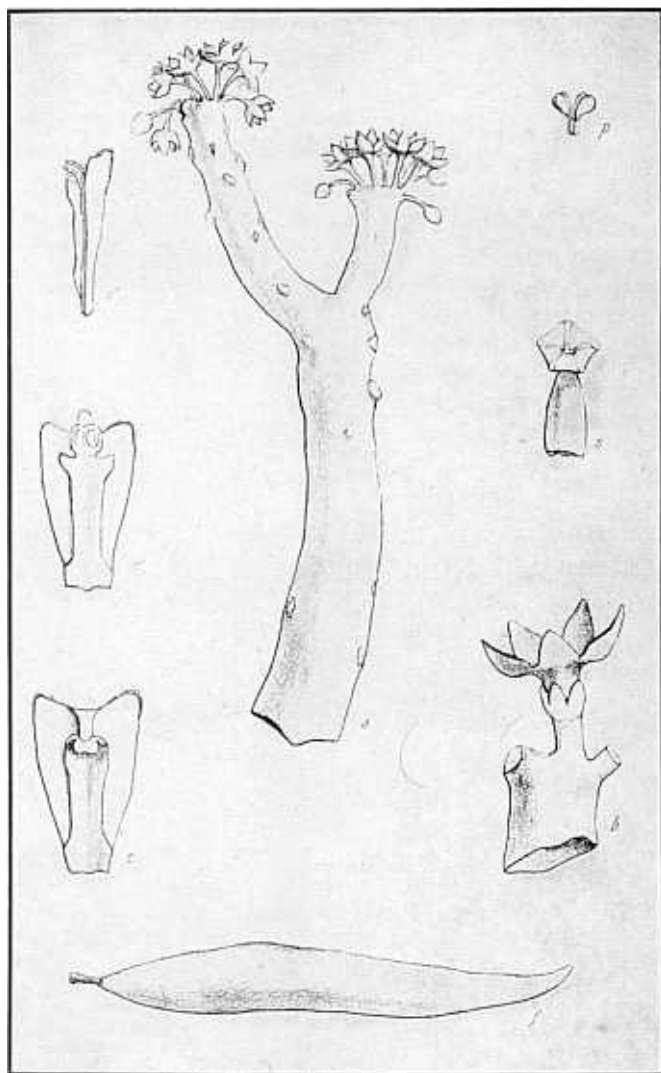
Stems: finger-thick, 12 to 18 cm. long, succulent, 4-angled, branching to 2 or 3 new stems; angles obtuse, with thick teeth, flat, round and scar-like at the apex;**Flowers:** few, large, at or near the apex of the stems;**Pedice:** 4 to 6 mm. long, thick;**Bracteoles:** 1 or 2, small, scale-like, triangular;**Sepals:** green, glabrous, lanceolate;**Corolla:** when expanded rotate, lobed to below the middle, outside bright green, inside glabrous, intensely blackish-purple, glandular-papillose; *tube* short, 2 mm. long; *lobes* fleshy, 8 mm. long, oblong-lanceolate, obtuse, subreflexed at the margins;

FIG. 187

Caralluma cicatricosa N. E. Brown (b) x 1.

From Defflers: Voyage au Yemen, 1889.

Outer corona: lobes pouch-shaped, opposite the anthers, intergrown for the basal 3 mm., but the tips free for 1 mm., truncate, broadly sinuate-bifid, the segments obtuse and minutely ciliate;
Inner corona: lobes $\frac{3}{4}$ mm. long, tooth-like, linear-obtuse, arising from the sinuses between the outer corona-lobes and abruptly incumbent on the anthers and covering them, dorsally adnate to the outer corona.

Type locality: Unknown: Southern Arabia.

Distribution: Southern Arabia: Yemen: Wadi Schidja, near Menacha; Gebel Melhan, near Wolledje; Bilad Fodhli: southern slopes of Mt. Cham-Cham.

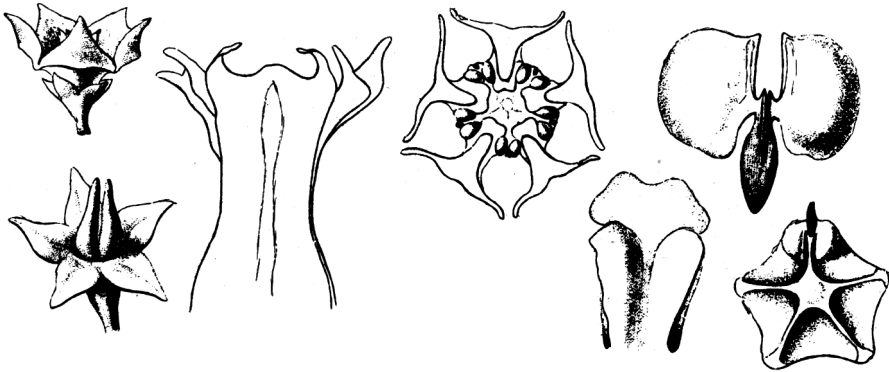


FIG. 188

Caralluma cicatricosa N. E. Brown

From Annales des Sciences Naturelles, 1838.

It is not known who first collected the remarkable "scarred *Caralluma*." It was known to Decaisne, who described it as *Desmidorchis forskalii* in 1838, but he confused the plant with the older *Caralluma quadrangula*, so that his specific name cannot remain valid. Schweinfurth rediscovered it in the Wadi Schidja, near Menacha, Yemen, in Feb., 1889, at an altitude of nearly 7000 feet. He gave *Kusma* and *Dra'et el Kelbe* as the native names for the plant.

The Latin name derives from the curious scars at the apex of the stem teeth.

The disk surface of the dark red flowers is raised in from 2 to 4 concentric areas of yellow welts, which give the corolla the appearance of having an annulus. Regarding the corona Dr. Brown wrote (Gard.Chron., l.c.): "The true structure of the corona of this plant is somewhat concealed by the two teeth, into which each of the outer corona-lobes is normally divided, being adnate throughout their length to the backs of the inner corona-lobes, so that the entire corona appears composed of five rectangular lobes, each with a projecting central tooth incumbent on the back of an anther."

39. *Caralluma anemoniflora* (Deflers) Berger, Stap. und Klein., 125. 1910.*Stapelia anemoniflora* Deflers, Bull. Soc. Bot. Fr., 25. 1896.

(Description based on that by A. Deflers, l.c., translated from the Latin):

Plant: a succulent herb, glabrous, glaucescent; *stems* erect, branching, rooting from the base, 2 to 6 cm. high, hardly finger-thick, clavate, obsoletely 4-angled, the sides swollen, dotted with white; teeth short, spreading, far apart;

Flowers: few, from the apex or sides of the stems, arising from a short thick peduncle 3 to 4 mm. long;

Pedicel: $2\frac{1}{2}$ to 3 cm. long, elongated, terete;

Sepals: 5 to 6 mm. long, deeply lobed;

Corolla: broadly campanulate, deeply lobed, the sinuses between the lobes acute; *lobes* oblong-lanceolate, nearly 3 cm. long, pale violet; marked on the outside with 10 longitudinal nerves of deeper color, covered on the lower half of the inner face, especially along the margins, with long clavate purple hairs:

Outer corona: growing out of the base of the corolla, very short, bowl-shaped with the margin unbroken;

Inner corona: 5 to 6 mm. long, the lobes free above, growing at the base from the staminal column, erect, incumbent over the anthers and equally produced above them at the tips, with a short thickened dorsal gibbosity.

Type locality: Southern Arabia: Bilad Fodhli: near Serrya.

Distribution: Not further known.

Discovered in a single specimen by A. Deflers in one of the shrubby valleys in the southerly foothills of el'Areys Mountain, near Serrya (Bilad Fodhli) in March, 1890. The natives call the plant *Dharwa* and consider it edible. Deflers added that, pickled in vinegar, it might be used as a condiment. It would be desirable to rediscover the plant, that its "elegant flowers," which Deflers compared to those of *Anemone silvestris* (whence the name) might become better known. The flowers appear to be over 2 inches in diameter, pale violet, covered on the lower half of the inner face, and perhaps ciliate, with long clavate purple hairs. The flowers are most interesting for their corona form. The outer corona is uniformly bowl-shaped, with no trace of distinct lobes nor any crenations along its edge, just a plain little tiny cup, growing according to Deflers, out of the corolla surface. The inner corona fore-

shadows the genus *Edithcolea* in the manner the lobes bend horizontally half-way up and meet above the anthers, but they do not have the warty upper surface characteristic of that genus, nor are they as broadly dilated.

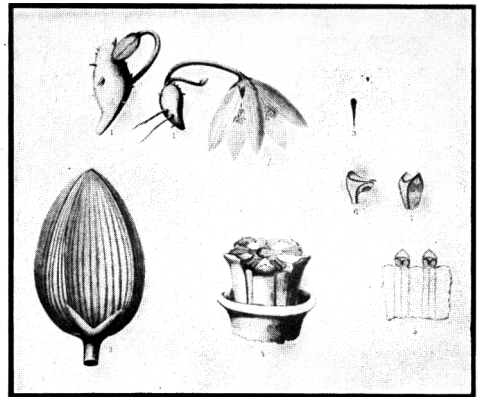


FIG. 189

Caralluma anemoniflora Berger x 0.33
From Deflers: Asclép. de l'Arabie Trop., 1896.

Caralluma rosengrenii

40. *Caralluma rosengrenii* Vierhapper, Oesterr. Bot. Zeitschr., 91. 1905.

(Description summarized from that of F. Vierhapper, l.c., translated from the Latin):

Stems: 4-angled, glabrous; angles obtuse, somewhat concave between the short teeth;

Flowers: solitary or 2 together near the apex of the stems;

*Pedice*l: stout, 4 mm. long, $2\frac{1}{2}$ mm. thick;

Sepals: lanceolate-acute, $2\frac{1}{2}$ mm. long, $1\frac{1}{2}$ mm. broad, glabrous;

Corolla: campanulate-rotate, glabrous, dark vermillion-red; *tube* 7 to 8 mm. long, 17 mm. in diameter, smooth at the base inside and out, above transversely rugose inside and minutely banded with yellow; *lobes* 8 to 10 mm. long, 10 mm. broad, broadly triangular-lanceolate, acuminate, reflexed at the margins, tuberculate-sulcate near the apex;

Outer corona: lobes cleft almost to the base, oblong-obovate, 3-toothed at the top, the lateral teeth lanceolate, erect, recurved, puberulous at the apex, the middle tooth triangular-lanceolate, incumbent on the backs of the inner corona-lobes;

Inner corona: lobes linear, dorsally adnate to the outer corona.

Type locality: Socotra: at the foot of Derafonte mountain.

Distribution: Also in the southerly half of the plain around Hadibu.

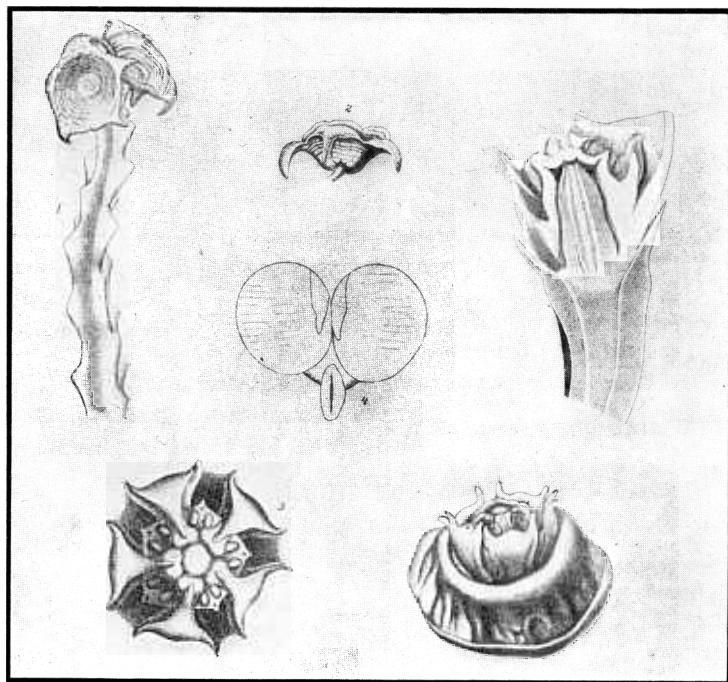


FIG. 190

Caralluma rosengrenii
Vierhapper (1) x 1.

From Denkschr. math. nat. Kl.
Kais. Acad. d. Wiss., 1907.

"Rosengren's *Caralluma*" was collected in the island of Socotra on Feb. 18, 1899, by Stefan Paulay, a member of the expedition sent by the Imperial Academy of Sciences of Vienna to Socotra, in 1898-1899. The species is named for Capt. H. Rosengren, the captain of the ship which carried the expedition to Socotra. The stems of the plant are probably tapering, bearing near

their apex one or two wholly glabrous dark red flowers, $1\frac{1}{2}$ inches in diameter, marked with concentric lines of yellow on the upper part of the broad central basin containing the corona. The outer corona-lobes are free almost to the base and 3-toothed at the top, the central tooth incumbent over the corresponding inner corona-lobe and adnate to it below.

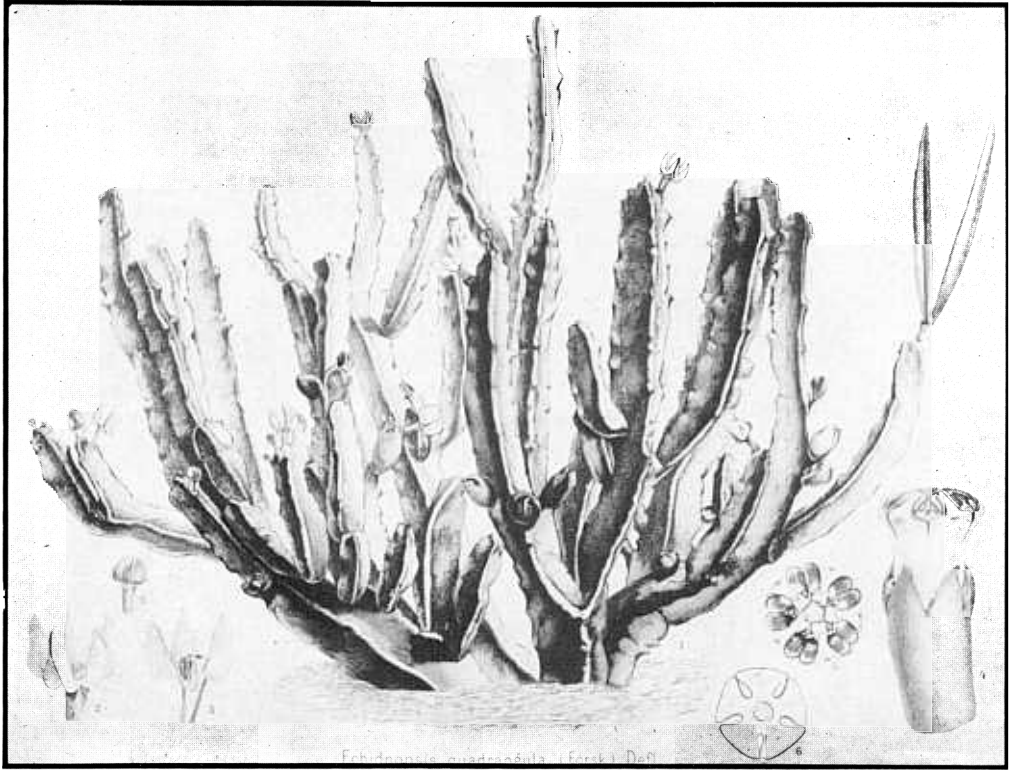


FIG. 191

Caralluma quadrangula N. E. Brown (3) x 1.

From Deflers: Asclép. de l'Arabie Trop., 1896.

41. *Caralluma quadrangula* (Forsk.) N. E. Brown, Gard. Chron., xii. 370. 1892.

Stapelia quadrangula Forskal, Flora Aeg.-Arab., 108. 1775.

Desmidorchis sp. Ehrenberg, Linnaea, 94. 1829.

Desmidorchis quadrangula Decaisne, Ann. Sc. Nat., ix. 265. 1838.

Desmidorchis forskalii Decaisne, Ann. Sc. Nat., ix. 265, *partim*. 1838.

Boucerosia quadrangula Decaisne, de Candolle: Prodrumus, viii. 664. 1844.

Boucerosia forskalii Decaisne, de Candolle: Prodrumus, viii. 648, *partim*. 1844.

Echidnopsis quadrangula Deflers, Bull. Soc. Bot. Fr., 20. 1896.

(Description based on that by A. Deflers, l.c., translated from the Latin):

Plant: a succulent green herb, branching freely from the ground; *stems* erect, to 40 cm. high, 1 to 3 cm. broad, greyish-green, 4-angled; angles obtuse with the sides flat, toothed and with tiny deciduous scaly leaves;

Flowers: single, scattered near the apex of the young stems;

Pedicel: 6 to 7 mm. long;

Sepals: deltoid, 2 mm. long;

Corolla: pale greenish-yellow, wholly glabrous, with a very short central tube, $2\frac{1}{2}$ mm. long, then broadly campanulate, with ovate lobes, 8 to 10 mm. long, with pointed tips and revolute margins;

Outer corona: absent;

Inner corona: of 5 lobes, $3\frac{1}{2}$ mm. long, united at their base and there cup-like, thence separating into thick cuneate tips, incumbent over the anthers and shorter than them, glabrous, pale rose, marked with transverse purple lines;

Follicles: 8 to 10 cm. long, 6 to 8 mm. thick, obtuse, fusiform.

Type locality: Southern Arabia: Yemen: Wadi Surdud.

Distribution: Widely distributed from Yemen to the eastern portion of Hadramaut.

The "quadrangular *Caralluma*" is the most representative Stapeliad in Southern Arabia, being widely distributed on many sunny slopes of the mountains there. It was first discovered by Peter Forskal in Yemen in 1763. The 1-inch flowers are pale yellow-green, the corolla-lobes peculiarly erect and with replicate edges, the five plates almost meeting at their tips, so that the inner face of the corolla is visible only through the narrow slits between the lobes. The corona appears 1-seriate, and a study of its architecture, in relation to that of *Caralluma penicillata*, *C. maculata* and *C. rangeana*, would be of great interest. The coronal form brings the plant into close relationship with the genus *Echidnopsis*. Defflers indeed transferred it to *Echidnopsis*, as he did *C. penicillata*, on account of the corona, but, as the only criterion of *Echidnopsis* is the tessellate structure of the plant stems, his diagnosis cannot be maintained. The stems could hardly furnish a more complete contrast to those of the genus *Echidnopsis*, for they are as square and flat-sided as those of any species in the

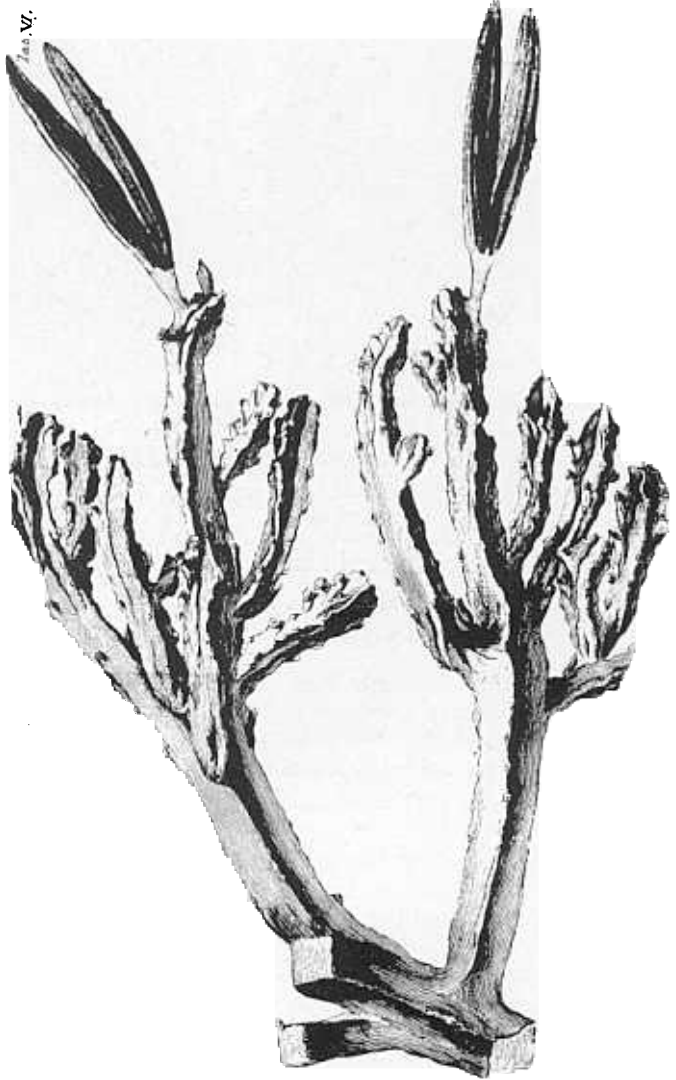


FIG. 192

Caralluma quadrangula N. E. Brown

From Forskal: Icon. Rerum Nat., 1776.

entire tribe, so that the specific name is particularly appropriate.

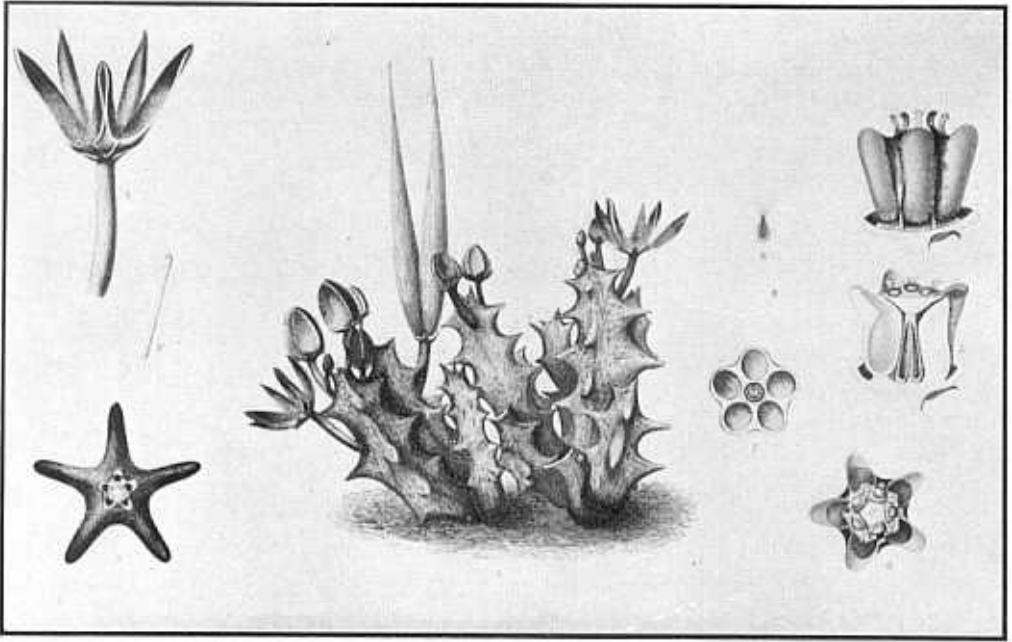


FIG. 193

Caralluma chrysostephana Berger (1) x 0.8

From Deflers: Asclép. de l'Arabie Trop., 1896.

42. *Caralluma chrysostephana* (Deflers) Berger, Stap. und Klein., 115. 1910.*Stapelia chrysostephana* Deflers, Bull. Soc. Bot. Fr., 24. 1896.

(Description based on that by A. Deflers, l.c., translated from the Latin):

Plant: a succulent, tufted herb; *stems* erect, 8 to 10 cm. high, 1 cm. thick, rooting from the base, 4-angled, glaucescent, with intensely green and some darker markings, glabrous; angles obtuse, with acute spreading teeth about 1 cm. long;

Flowers: few, often 2 together, from the sides of the stems;

Pedicel: $1\frac{1}{2}$ cm. (in fruit 2 to 3 cm.) long, 4 mm. thick, erect, more or less curved, marked with reddish lines;

Sepals: $2\frac{1}{2}$ to 3 mm. long, linear-acute;

Corolla: fleshy, campanulate; outside glabrous, grey-green with reddish lines; inside dark purple, with the centre and base of the lobes covered with long white clavate hairs, the upper third part glabrous; *tube* $2\frac{1}{2}$ mm. deep, cup-shaped; *lobes* 12 to 15 mm. long, oblong, acuminate, revolute at the margins;

Outer corona: intensely golden, 3 to $3\frac{1}{2}$ mm. high, formed of 5 intergrown pouches, with the margins sinuous and somewhat spreading;

Inner corona: lobes adnate at the base to the outer corona, incumbent over the anthers and produced above them in a recurved point, 1 mm. long, purple on the back, otherwise golden.

Type locality: Southern Arabia: Bilad Fodhli.

Distribution: Not further known.

Discovered by A. Deflers on a rocky hillside on the southern slope of el 'Areys Mountain, Bilad Fodhli, in April, 1893.

The 1-inch flowers have the corolla deeply cleft, as in *C. luntii*, purple-brown within, the lower half of the long narrow

corolla-lobes covered with long white hairs. The outer corona consists of 5 upright pockets, their striking golden-yellow color giving the species its name, the "golden-crowned *Caralluma*." All its surface, according to Deflers, is covered with glandular spots and secretes a sticky honey which

gathers at the bottom of the pockets. The flowers are said to be odorless, blooming freely from the beginning of spring to the middle of autumn. The plant was grown for a number of years in the garden of Mr. Deflers in Cairo, but has now vanished from cultivation.

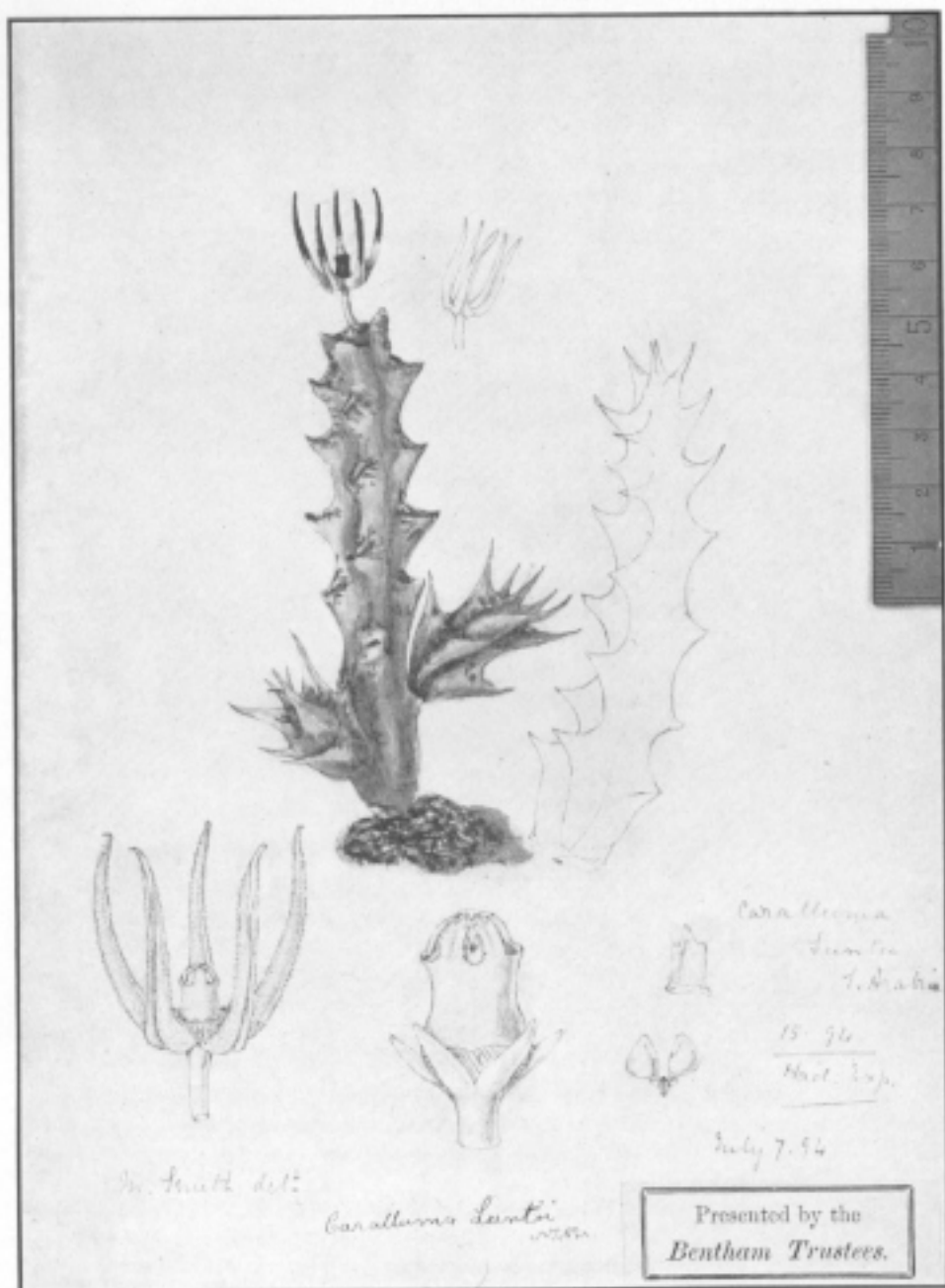


FIG. 194

Caralluma luntii N. E. Brown x 0.6

Drawing by Miss Matilda Smith. Reproduced by permission of the Bentham Trustees.

43. *Caralluma luntii* N. E. Brown, Kew Bull., 335. 1894.

(Description by Dr. Brown, l.c., translated from the Latin) :

Plant: up to 6 to 8 in. high; *stems* $\frac{1}{2}$ to $\frac{3}{4}$ in. thick, branching, thickly fleshy, 4-angled, glabrous, pale green marbled with purple; angles obtuse with large spreading conical-spine-shaped teeth, 4 to 5 lin. long;

Flowers: 1 to 3 near the apex of the stems in small fascicles;

Pedicel: glabrous, 4 to 10 lin. long, $\frac{2}{3}$ lin. thick;

Sepals: 1 lin. long, lanceolate-subulate, reflexed, glabrous;

Corolla: lobed almost to the centre, with no tube; *lobes* 8 to 9 lin. long, $\frac{1}{2}$ lin. broad (1 lin. broad when flattened out), elongated, linear, incurved-erect and connivent, with replicate margins, very minutely puberulous within, yellowish-green below the middle, purple above and along the margins;

Staminal column: with corona $1\frac{1}{2}$ lin. long and wholly purple;

Outer corona: reduced to minute little pouches at the apex of the strong cylindrical staminal column;

Inner corona: lobes $\frac{2}{3}$ lin. long, linear-oblong, acute and denticulate, closely incumbent on the anthers and hardly exceeding them.

Type locality: Southern Arabia: on hills near Dobaibah.

Distribution: Not further known.

"Lunt's *Caralluma*" is named for its discoverer, William Lunt. He collected it in Southern Arabia, on hills near Dobaibah, growing at the base of other plants at an elevation of 4,000 feet, in February, 1894. It is a remarkable species, the flowers having the lobes cleft almost to the centre of the corolla and extremely narrow and replicate, about $\frac{2}{3}$ -inch long, but only $\frac{1}{24}$ -inch wide (or $\frac{1}{12}$ -inch wide when fully flattened out). The flowers grow not more than 3 together from the tip of the stems and the corolla-lobes point directly up-

wards in a very striking manner, like curiously-shaped circular pitchforks. "A very distinct and easily recognized species," wrote Dr. Brown. "In the other species known to me the corona, or at least the base of the staminal column, is more or less included in a short tube or depression at the base of the corolla, but in *C. luntii* the base of the corolla is flat, with the corona raised well above it on the stout staminal column, which is of equal diameter with the corona."

44. *Caralluma torta* N. E. Brown, Kew Bull., 142. 1901.

(Description by Dr. Brown, l.c., translated from the Latin):

Stems: obtusely 4-angled, 4 to 5 lin. thick, rugulose, minutely pubescent; angles lightly toothed; leaves $1\frac{1}{2}$ lin. long, lanceolate-subulate, pubescent;*Flowers*: solitary, shortly pediceled, pubescent on the outside;*Sepals*: $\frac{3}{4}$ to 1 lin. long, reflexed;*Corolla*: 8 to $8\frac{1}{2}$ lin. long; lobes linear, arched at the base into a 5-windowed globe, above wound into a long twisted slender column, globose-clavate at the tip, inside glabrous, green spotted at the base with purple-brown;*Corona*: purple-brown with the tips of the lobes pale;*Outer corona*: lobes nearly $\frac{1}{2}$ lin. long, erect, deeply bifid;*Inner corona*: lobes incumbent over the anthers and longer than them, flat, oblong, obtuse, dorsally more or less produced into a spur.

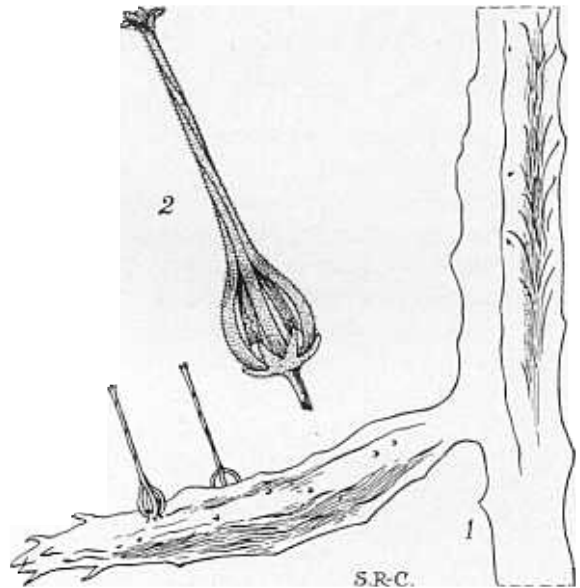
Type locality: Unknown: probably Southern Arabia or Socotra.

Distribution: Unknown.

FIG. 195

Caralluma torta N. E. Brown

Drawn by Miss S. Ross-Craig: (1) Flowering stem, after a drawing by N. E. Brown in the Kew Herbarium $\times 1$.; (2) from a dried flower in the Kew Herbarium $\times 3$.



The "twisted *Caralluma*" was sent to the Royal Botanic Gardens, Kew, in 1897, by Theodore Bent without a precise statement as to its habitat, which is assumed to be either Southern Arabia or Socotra. It embodies one of those unique manifestations in the Stapeliads with which one is so often surprised. The narrow corolla-lobes of the $\frac{2}{3}$ -inch flowers curve towards one another

and their tips become intertwined like a twisted length of rope, leaving only window-like openings between the lobes at the base. The corolla is glabrous within, green with purple-brown spots at the base. The flowers are solitary, near the apex of the stems. The stems are described as very minutely pubescent, a character attributed to no other *Caralluma* except *C. huillensis*.

45. *Caralluma corrugata* N. E. Brown, Kew Bull., 280. 1912.

(Description by Dr. Brown, l.c., translated from the Latin):

Stems: primary branches much branched on the upper part, glabrous; when dried 2.5 to 8 cm. long, 3 to 6 mm. thick, crowded, 3 to 4-angled; angles with small broadly deltoid teeth, minutely puberulous at the tips;

Flowers: solitary, on and below the apex of the stems;

Pedicel: 1 to 2 (in fruit 4 to 8) mm. long, glabrous;

Sepals: 1.3 to 2 mm. long, ovate-lanceolate, acute or acuminate, glabrous;

Corolla: 19 to 21 mm. in diameter, outside smooth, inside in the tube and on the disk concentrically corrugated and on the lobes tuberculate, glabrous, brownish-purple (?); *tube* campanulate, 4 mm. long; *lobes* very spreading, 6 to 7 mm. long, 7 mm. broad, deltoid-ovate, acute, with recurved margins;

Outer corona: 10-toothed, teeth in pairs opposite the anthers, erect, $\frac{1}{2}$ mm. long, subulate, with a few hairs;

Inner corona: lobes $\frac{3}{4}$ mm. long, subulate-linear, obtuse, equaling the anthers and closely incumbent on them.

Type locality: British Somaliland: without precise locality.

Distribution: Not further known.

The "wrinkled *Caralluma*" was collected by Col. Drake-Brockman in British Somaliland about 1912. It is called *Gurrato* by the Somalis. It is a unique species in that the campanulate tube and central disk of the $\frac{3}{4}$ -inch flowers are covered with concentric corrugations, whence the name. The corolla-lobes are tuberculate and widely

spreading. The stems are 1 to 3 inches high, densely branched, and they are described as 3 to 4-angled, the flowers solitary at or near the apex. This is one of the very few references to 3-angled stems in any *Stapeliad*, the others relating to *Caralluma rivae*, *C. dicapuae*, *C. retrospicens* var. *tombuctuensis* and var. *acutangula*, and *C. ango*.

46. *Caralluma rivae* Chiovenda, Flora Somala, 222. 1929.*Caralluma subulata* K. Schumann, Ann. Istit. Bot. Roma, vii. 43. 1898. *Nec* Decaisne, 1838.

(Description based on that by Prof. E. Chiovenda, l.c., translated from the Latin):

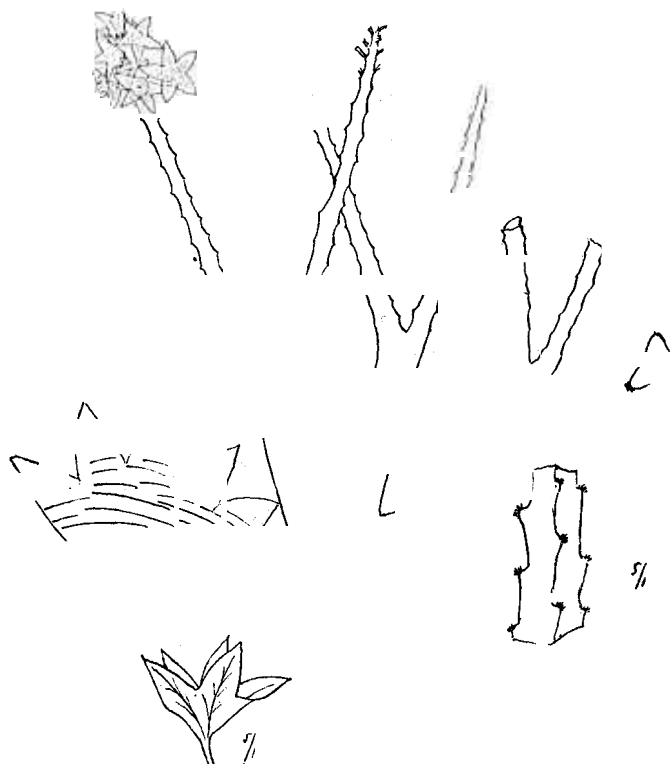
Stems: 5 to 10 cm. long, 1 to 1½ cm. thick, branching at the apex into several simple 3-angled branches, 8 to 12 cm. long; angles obtuse; teeth 7 to 10 mm. apart, 1 to 2 mm. long;*Flowers*: solitary, 5 to 8 along the upper part of each stem;*Pedicel*: glabrous, 2 to 3 mm. long;*Sepals*: 2 mm. long, 1 to 1⅓ mm. broad, ovate-triangular;*Corolla*: 20 to 22 mm. in diameter; *tube* 1½ mm. long, 2 mm. wide, whitish; united portion of *limb* campanulate, 8 mm. long, abruptly rounded at the base and then tapering into the tube, 10 mm. in diameter at the mouth, ochreous outside in the dried state, yellow inside with irregular transverse concentric lines and spots; *lobes* spreading, ovate-triangular, acuminate, 10 to 12 mm. long, 5 to 7 mm. broad, velvety dark purple with the tips yellow;*Outer corona*: ring-shaped, equaling the anthers, with the lobes free to half-way down, deeply bifid into two equal linear-triangular acute erect segments, which have a short dense ciliation at the apex;*Inner corona*: lobes spatulate, obtuse, glabrous, curved above the anthers, 2-keeled on the outer face;*Staminal column*: 3 to 3½ mm. high, 2½ to 3 mm. in diameter at the top, whitish below, dark purple above.

FIG. 196

Caralluma rivae Chiovenda

Drawing by Prof. Emilio Chiovenda from the herbarium specimen collected by Stefanini and Puccioni.

Type locality: Ethiopian Somaliland: Ogaden: 5 hours from Lafarug.

Distribution: Also recorded from Milmil in Ogaden; and from Central Italian Somaliland: Sultanate of Obbia: between Bihlelli and the southern slopes of Ilbehlá.

"Riva's *Caralluma*" was discovered on December 10, 1892, growing in dry sandy places and among rocks in Ogaden, the easterly point of Ethiopian Somaliland, by Prince Eugenio Ruspoli and his companion, Dr. Domenico Riva, and it was named for the latter by Prof. Emilio Chiovenda. Later it was collected in Italian Somaliland by two other Italian explorers, Puccioni and Stefanini, who described the plant with a rather pungent climax as having "velvety red flowers, cup-shaped, with the apex of the lobes yellow and a disgusting odor!" *Caralluma riva* is related to the deeply campanulate *C. speciosa*, but the flowers are solitary instead of being borne in terminal umbels. They differ also in being

smaller (about an inch in diameter) and in having a short thick ciliation on the segments of the outer corona-lobes. The bell-shaped united portion of the corolla is yellowish, with concentric dark purple lines and spots, the lobes dark purple with yellow tips. The stems are said to branch at the top into a number of 3-angled branches. If this is a constant character, it must be a very striking one and it may indicate some degree of relationship to another Somaliland species, *C. corrugata*. *C. riva* differs greatly, however, from the latter in that its flowers do not have the concentric corrugations of the corolla, while the corolla-tube is very much deeper and the inner corona-lobes are spatulate in shape.

47. *Caralluma angu* (A. Richard) N. E. Brown, Gard. Chron., xii. 369. 1892.*Stapelia angu* A. Richard, Tentamen Flor. Abyss., ii. 50. 1851.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 488):

Stems: a span high, erect, branched, 3 to 4-angled, glabrous; angles stoutly toothed; teeth acute, usually ascending;*Flowers*: arising from the upper part of the branches, shortly pedicellate;*Sepals*: oblong-lanceolate, acute, glabrous;*Corolla*: scarcely 1 in. in diameter, deeply 5-lobed; lobes ovate-oblong, acute, green on the back, blackish-purple within.

Type locality: Ethiopia: Province of Shiré.

Distribution: Not otherwise known.

There is a group of *Carallumas*, which occupies a very distinctive position in the northern half of Africa, one member (*C. commutata*) possibly having its habitat in southern Arabia. This group, which extends in distribution from southern Morocco to Eritrea and crosses the Equator into the Belgian Congo, may conveniently be called the "Angu group," from the native Ethiopian name, *Angu*, applied to several of the species indiscriminately. The similarity between the species in the group begins with the character of the stems, which are very strongly toothed and beautifully mottled or purpled over when grown in full sunlight, and it extends to the coloring of the flowers, which assume nearly uniform shades of dark brown, purple, chestnut and mahogany. The shapes of the corolla differ very much between some of the species, and the corona forms are very distinct, assuming some very interesting types. The species bearing the name of the whole group, *Caralluma angu*, was discovered by Quartin Dillon in the Province of Shiré, northern Ethiopia, about 1840. It is uncertain whether plants collected in later years by Beccari in Eritrea and by Schimper in Ethiopia under the same name belong to the species or not. Indeed the incomplete description makes it impossible for *C. angu* to be anything more than a name. The statement that the stems are sometimes 3-angled would separate it from all the other species in the group, if this

were a reliable character; in other respects the stems seem identical with those of the entire group. Dr. N. E. Brown once hazarded the opinion that *C. angu* might prove identical with *C. sprengeri*, while Berger thought it might turn out to be *C. commutata*. Nearest of all in some respects is *C. baldratii*, especially in the particular of the deeply-lobed corolla, but no identification of *C. angu* can ever be anything but a guess.

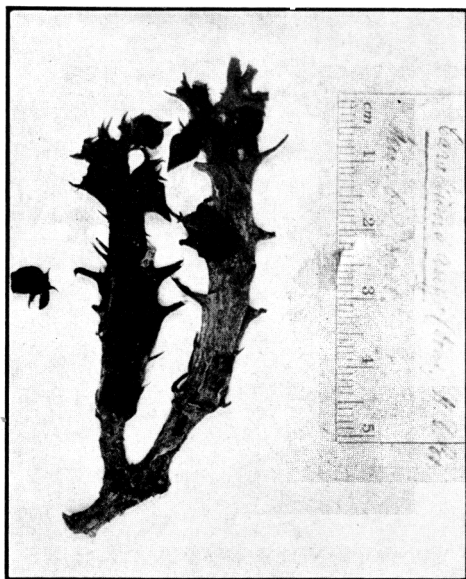


FIG. 196-A

Caralluma angu N. E. Brown

From a photograph of a specimen in the Herbarium of the Berlin-Dahlem Botanic Museum. We do not know by whom this specimen was collected.

48. *Caralluma sprengeri* (Schweinfurth) N. E. Brown, Kew Bull., 263. 1895.

Huernia sprengeri Schweinfurth, Cat. Dammann & Co., 46. 1893.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 484):

Stems: up to 5 in. high, branched, 4-angled, about $\frac{3}{4}$ in. square including the teeth, glabrous, green, mottled with purple on darker green; angles obtusely rounded, strongly toothed; teeth 3 to 6 lin. long, ascending-spreading, conical, tapering to a fine point;

Flowers: in fascicles of 5 to 6 between the angles, near the apex of the branches;

Pedicel: $\frac{1}{8}$ in. long, stout, glabrous;

Sepals: about $\frac{1}{8}$ in. long, attenuate-deltoid, acuminate, glabrous;

Corolla: rotate, about $\frac{3}{4}$ in. in diameter, purple, glabrous on the back, minutely and densely pubescent on the inner face; *disk* with a slightly raised rim around the mouth of the very shallow depression in which the corona is contained and contiguous to the latter; *lobes* 4 to 5 lin. long, $2\frac{1}{2}$ to $2\frac{3}{4}$ lin. broad at the base, ovate, acuminate, flat;

Outer corona: arising from the $\frac{3}{4}$ -lin.-long staminal column and as long as it, annular, truncate and rather thick and fleshy at the rim, reddish;

Inner corona: lobes oblong, obtuse or denticulate at the apex, dorsally attached at the base to the outer corona, ascending above the level of the latter, incumbent on the backs of the anthers and equaling or slightly longer than them, reddish;

Anthers: subquadrate, not appendaged, incumbent on the sloping sides of the truncate style.

Type locality: Ethiopia: Adowa.

Distribution: Eritrea: Kohaito; Sudan: between Suakin and Berber; Erkanit, in clefts of granite rock.

"Sprenger's *Caralluma*" was discovered near Adowa, in the north of Ethiopia, by A. Petit, fellow-explorer with Quartin Dillon, about 1840. It was again collected by Prof. Schweinfurth in 1868, between the Nile and the Red Sea, a little below the tropic. Twenty-five years later he introduced the plant into Europe from his garden in Eritrea and named it for C. Sprenger of the firm of Dammann and Co. in Naples, who distributed it to the fanciers of the day.

The large plant shown in the figure is perhaps to be regarded as a little fanciful. The flowers are greenish outside, purple to yellowish within, densely pubescent at the centre and somewhat less so upon the lobes, the margins of the lobes flat or slightly rolled back. The outer corona is annular, without distinct lobes, but with its upper edge undulating and fleshy. The inner corona-lobes arise from the outer corona and bend in over the anthers, their tips irregularly toothed.

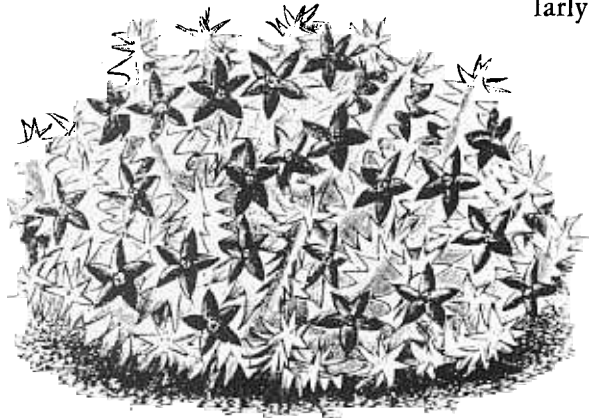


FIG. 197
Caralluma sprengeri N. E. Brown
x 0.3
From Gartenflora, 1897.

49. *Caralluma decaisneana* (Lemaire) N. E. Brown, Gard. Chron., xii. 369. 1892.*Boucerosia decaisneana* Lemaire, Herb. Gén. Amat., iv. t. 21. 1844.*Stapelia decaisneana* A. Chevalier, Rev. Bot. Appl., 262. 1934.

(Description summarized from that by Prof. Chevalier, l.c., translated from the French):

Stems: 10 to 40 cm. high, 1½ cm. thick a little above the base, tapering towards the apex, erect, branching, glabrous, distinctly grooved between the 4 rounded angles, a handsome shade of green, more or less marbled or dotted in brown; teeth ascending-spreading, stout, conical-subulate, 10 to 15 mm. long, placed opposite 2 by 2 on the stems, sometimes bringing out buds or new branches at the axils;

Flowers: in small fascicles of 1 to 3, near the tips of the branches;

*Pedice*l: short, 3 to 5 mm. long prior to efflorescence, with 2 to 5 subsessile disk-like glands 1½ mm. in diameter and occasionally some very small filiform bracts 1 mm. long;

Sepals: oblong-subulate, 4 to 5 mm. long, glabrous;

Corolla: in bud elongated ovoid; when expanded rotate (according to Lemaire's drawing), 2½ cm. in diameter, glabrous, with a short campanulate central tube; lobes ovate-oblong, acute, 10 to 12 mm. long, dark purple, frosted with minute whitish papillae;

Inner corona: of 5 broad lobes, appressed to the staminal column;

Follicles: 2, linear-erect, thicker at the base.

Type locality: Senegal: without precise locality.

Distribution: Senegal: Saint-Louis; Gaudiolle; on south bank of Lake Retba, Cape Verd peninsula; and between Lake Retba and the ocean; French Sudan: Djenné; in the Mossi, between Tangaye and Lozitunga; ? Mauretania: Nouakchott; Tichten.

"Decaisne's *Caralluma*" is a most interesting plant, embodying characteristics of both *Caralluma* and *Stapelia*. It was first described by Charles Lemaire in 1844. He dedicated it to J. Decaisne, who in the same year was editing the ASCLEPIADACEAE for the *Prodromus* of de Candolle. It is believed to have been discovered about 1825 in Senegal by Perrottet and was in cultivation at the Paris Museum until 1842 or later. It has since been collected again at several points in Senegal, as well as in the French Sudan and probably in Mauretania, although the identification in the last instance is uncertain. Prof. Chevalier found the plant to be rare, usually growing on waste dunes or on rubbish heaps outside of villages (in one place on cultivated soil, in the cotton fields), as if perhaps prior to the coming of Islam it had been cultivated by local magicians as a fetich plant. The natives of Mauretania, if the plant from that country previously referred to is actually the same species, call it *Abila* or *Abouaila*.



FIG. 198

Caralluma decaisneana N. E. BrownFrom *Herbier Gén. Amat.*, 1844.

in their Arab dialect and consider it to be violently poisonous. M. Jean Trochain reports it as fairly frequent in the western Senegal. He tells of finding it growing in low tufts on fixed dunes on the Cape Verd peninsula and at Gaudiole, 12 miles south of St. Louis. The flowering period corresponds to the end of the rainy season, which usually lasts in Senegal from June to October.

The stems of *C. decaisneana* very much resemble those of such *Stapelias* as *S. longidens*. The dark purple or reddish-brown *Stapelia*-like flowers form small fascicles near the tips of the stems, the pedicels growing out of irregular cushions, which also frequently bear small sessile glands and tiny bracts. The glands secrete a substance attractive to ants, which often visit the plant, though it is not certain what service they may render in return for their feast.

The flowers have a short central tube, 4 mm. deep and 8 mm. in diameter at the mouth, and this tube is just filled by the corona and staminal column. The corolla is minutely papillose from the tips of the lobes down into the tube, the papillae tipped with white hairs, which give a characteristically frosted tone to the deep purple of the corolla surface.

Prior to 1934 the plant was considered as a *Caralluma* (*Boucerosia*). In that year Prof. Chevalier transferred it to *Stapelia*, because of the general resemblance of the stems and flowers to that genus. We are

returning it to *Caralluma* only because the corona more nearly approaches to the description of the coronas in such species as *C. quadrangula* and *C. penicillata*. M. Jean Trochain has very kindly given us the opportunity to study this singular corona by sending us in formalin some admirable specimens of the stems and flowers collected by him recently on the Cape Verd peninsula. The corona has the lobes so intergrown as to appear 1-seriate. The section corresponding to the outer corona forms a cup-shaped wall, closely encircling the staminal column. The broad lobes are wholly intergrown, hardly distinguishable save for a slight crenation at the upper edge. The inner corona-lobes continue directly springing from the outer corona fabric, and bending over the edge and top of the staminal column. Individually they are of an irregularly oblong shape, 1 mm. wide at the apex, and flaring out to 2 or 3 mm. at the point where they bend over the edge of the staminal column. The outer corona fabric is curiously pinched in and fastened to the bases of the inner corona-lobes, and pulled out and down in the intervening spaces, forming little spade-shaped pouches which alternate with the inner corona-lobes. The pollen-sacs are situated at the base of the coronal pouches. They are bright yellow in color, very prominent and large in proportion to the size of the flower. Lemaire's dissection of the corona in the upper corner of his plate gives a very imperfect idea of the coronal structure.

50. *Caralluma venenosa* Maire, Bull. Hist. Nat. Afr. Nord, 305. 1931.

(Description summarized from that by Dr. René Maire, l.c., translated from the Latin):

Stems: indistinguishable from those of *C. sprengeri*, *C. commutata* and *C. hesperidum*;

Flowers: near the apex of the stems, extra-axillary, in small fascicles of 2 to 4 buds, but solitary in bloom through abortion of the remaining buds;

Bracts: whitish, submembranaceous, up to 1 mm. long and 0.4 mm. thick, lanceolate, acute;

*Pedice*l: short, thick, up to 2.5 to 3 mm. long in fertile flowers and 3 mm. thick, subobconical, greyish-green, lined or spotted with purple;

Sepals: entirely ovate-obtuse from the base, wholly glabrous, erect-spreading, not reaching to the sinuses between the corolla-lobes, greenish-white, up to 4.5 mm. long;

Corolla: 18 to 20 mm. in diameter, with a campanulate tube, a rotate limb and lobes cleft about half-way down; *tube* 5 to 6 mm. long, about 7 mm. in diameter at the mouth, within minutely papillate, faintly purple-brown, outside greyish-green faintly suffused with chestnut and marked with blackish-purple spots, glabrous, divided from the limb by an abrupt inwardly-projecting margin; *limb* rotate, lobed to within about 2 mm. of the base, inside blackish-purple, densely papillate, outside faintly chestnut spotted with purple-brown, glabrous; *lobes* ovate-acuminate, more or less revolute at the apex and along the sides, about 7 mm. long and 5.5 to 6 mm. broad, ciliate with elongated clavate hairs;

Outer corona: much shorter than the corolla-tube, cup-shaped, dark purple, glabrous, star-like, much removed from the staminal column, the 5 lobes deeply pouch-shaped with thickened edges;

Inner corona: lobes adnate at the base to the outer corona-lobes, dark purple, obovate, the tips obtuse or toothed, incumbent over the anthers;

Staminal column: sessile, the upper surface pentagonal, with 5 radiating sections, white;

Follicles: greyish-green with dark purple lines, similar to those of *C. hesperidum*.

Type locality: Central Sahara Desert: Hoggar: Mount Ater.

Distribution: Atakor-n-Ahaggar: Tigendaoui; Oued Ilaman; Tehi-n-Tekart.

Discovered by Dr. R. Maire on an expedition to the Hoggar in the central Sahara Desert in March and April, 1928. He named it the "poisonous *Caralluma*" because the natives, the Touaregs, who know the plant well and call it *taiberou*, believe it to be extremely toxic and it is never eaten by any animals. It greatly resembles *Caralluma commutata*, *C. hesperidum* and *C. sprengeri*. The resemblance is especially striking to the first of these. It has, however, smaller flowers, with shorter pedicels; the campanulate corolla-tube is much longer and is sharply separated from the disk by a clear-cut margin; the corona is distinctly shorter than the corolla-tube; and the inner corona-lobes are entire or barely crenate at the tips, and not furrowed on the back. *C. venenosa* differs from *C. hesperidum* in having solitary flowers, due to the abortion of the remaining buds in each fascicle; the flowers are larger, their color

darker, the pedicels longer and bent during the period of inflorescence, and the corona further removed from the staminal column, with angles strongly emarginate. Finally *C. venenosa* differs from *C. sprengeri* in its coronal structure and in not having conspicuously long narrow corolla-lobes.

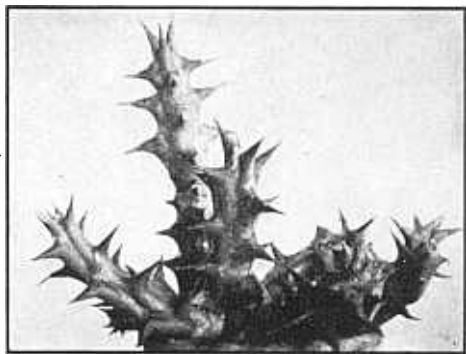


FIG. 199

Caralluma venenosa Maire

Stems only. Photo by E. Jahandier

51. *Caralluma sacculata* N. E. Brown, Kew Bull., 328. 1909.

(Description by Dr. Brown, l.c., translated from the Latin):

Stems: erect or decumbent at the base, 5 to 8 cm. long, over 1 cm. thick excluding the teeth, 4-angled, glabrous; angles with persistent subulate very acute teeth, 8 to 11 mm. long;

Flowers: in fascicles of 3 to 4, near the apex of the stems;

Pedicel: 6 to 8 mm. long, erect, glabrous;

Sepals: 6 mm. long, lanceolate-acuminate, glabrous;

Corolla: tubular-campanulate; *tube* when dried 8 to 10 mm. long, 6 to 8 mm. in diameter at the base, narrower above, glabrous inside and out, apparently greenish; *lobes* spreading, 5 mm. long, 3 mm. broad, deltoid-ovate, the margins revolute, glabrous outside, minutely puberulous within, dark purple;

Outer corona: formed of 5 pouches, $3\frac{1}{2}$ mm. long, 5 mm. in diameter, equaling the staminal column in length, glabrous, with the tips of the pouches shortly bifid;

Inner corona: lobes $1\frac{3}{4}$ mm. long, linear, obtuse, glabrous, incumbent on the anthers and the tips erect, adnate at the base to the outer corona.

Type locality: Southern Ethiopia: without precise locality.

Distribution: Not further known.

Closely related to *Caralluma sprengeri*, from which it differs in having the central tube of the corolla longer than the corolla-lobes and in having the outer corona-lobes pouch-shaped. The latter character gives

the species its name. The plant was collected by Col. Drake-Brockman in 1908-1909, while acting as Medical Officer to the Anglo-Abyssinian Boundary Commission.

52. *Caralluma baldratii*, sp. nov.

(Description by A. White and B. L. Sloane) :

Species ex *Erythraea* innotuit, a reliquis generis forma coronae valde diversa. Corona exterior cyathiformis, lobi late rotundati apice undulato-crenati; coronae interioris lobi ceraso-coccinei, in cornua dua furcati: horum unum, apice denticulatum, ad basem pinnuscula quadam insignitum, antheris incumbit; alterum longum angustumque, apice denticulatum, ad sinos cum corona exteriore connatum, seriem simulat velut loborum coronae exterioris, cum lobis veris brevioribus alternantium. Corolla 28 mm. lata; discus lobique ad basem pallide brunnei, pilis albis brevibus puberuli; lobi ad apicem fusco-brunnei minute puberuli.

Stems: as in *Caralluma hesperidum* and the other species of the "Ango group," but less distinctly grooved, 4-angled, the side facing the sun purpled all over and not characteristically mottled as in *C. hesperidum*; teeth a little more horizontal, but the tips pointing upwards;

Flowers: solitary or very few together near the apex of the stems, sessile;

Corolla: 28 mm. in diameter, disk and basal portion of the lobes light mahogany, or sometimes cream colored with tiny red spots, covered with microscopic stiff white hairs, upper portion of the lobes dark mahogany with a microscopic stiff pubescence; lobes 2 mm. broad at centre, replicate more than half-way down;

Outer corona: cup-shaped, blackish-purple, with five broadly rounded lobes 0.5 mm. long and sinuate-crenate at the apex;

Inner corona: lobes cherry-red, two-horned; inner horn incumbent upon the anthers and variably toothed at the apex, with a short projection or fin just above the base; outer horn 1.5 mm. long, narrow, variably toothed at the apex, connate with the outer corona at the sinuses between the outer corona-lobes and appearing to form a second series of outer corona-lobes alternating with the real outer corona-lobes, which are very much shorter.

Type locality: Eritrea: near Asmara, at 7,000 feet elevation.

Distribution: The high plateau near Asmara.

The type plant of this new species is No. 208 in the White and Sloane collection. It was grown from seed sent from Eritrea by Dott. Isaia Baldrati of the University of Pisa, stationed at Asmara, and we have named it for him, in recognition of the valuable botanical work he has achieved in Eritrea during a period of thirty years. The species grows on Dr. Baldrati's estate, Addi Ché, near Asmara and is common throughout the high plateau. The natives consider the stems edible and call the plant *Angó*, a name impartially given by them to several other *Stapeliads*. While it is possible that this is the original *Stapelia angó* of A. Richard, we have given on p. 262 our reasons for not identifying it with that species.

The flowers of *C. baldratii* are borne near the apex of the stems, without any pedicel, the small calyx springing directly from the stem. The corolla is deeply cleft, dark ma-

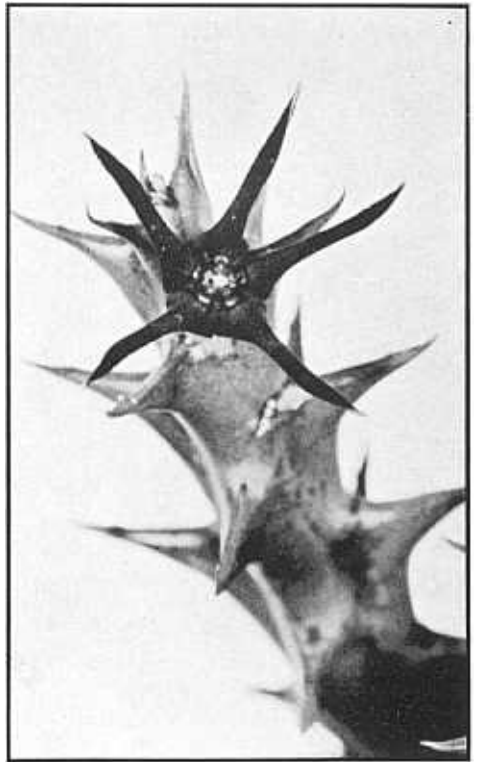


FIG. 200
Caralluma baldratii, sp. nov. x 2.

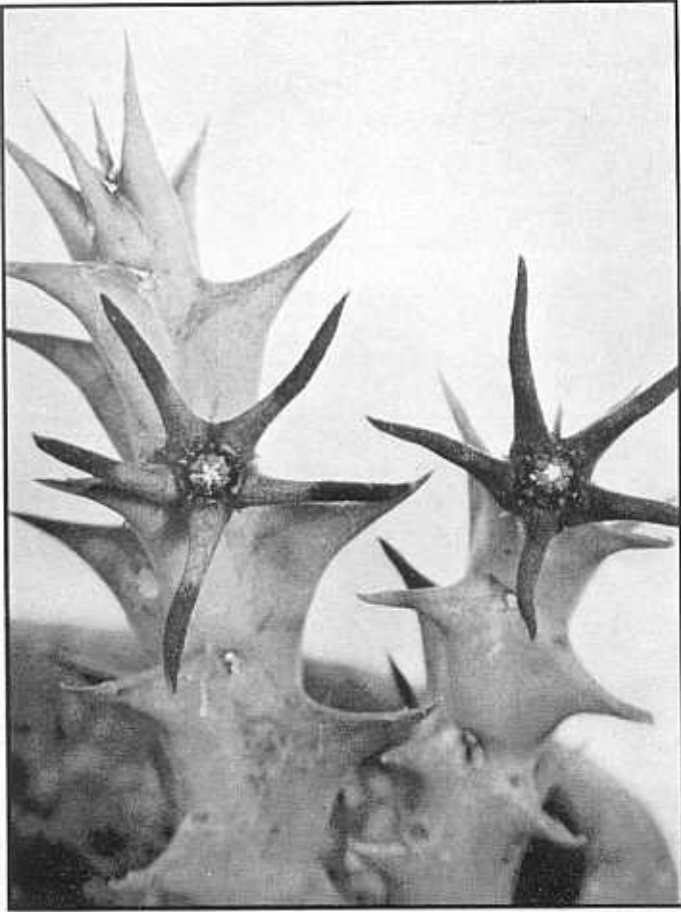


FIG. 201
Caralluma baldratii, sp. nov. x 2.

hogany on the upper part of the lobes, lighter colored on the lower half and on the disk.

The outer corona appears at first sight to be formed of five rounded blackish-purple crenate lobes alternating with five very long and slender cherry-red variably toothed lobes. Actually the long slender

segments are a part of the inner corona. They correspond to outer horns of the inner corona-lobes in such species as *Stapelia variegata*, for they extend out from the base of the incumbent inner horns. Their extreme length makes them very conspicuous and gives the entire corona a very distinctive effect.

53. *Caralluma hesperidum* Maire, Bull. Soc. Hist. Nat. Afr. Nord, xiii. 17. 1922.

Caralluma commutata ssp. *hesperidum* Maire, Cat. Pl. du Maroc, iii. 582. 1934.

(Description summarized from that by Dr. René Maire, Bull. Soc. Hist. Nat. Afr. Nord, l.c., translated from the Latin) :

Plant: perennial, throwing out cactoid stems, simple or branching, from a smooth whitish rhizome; *stems* greenish-white irregularly mottled with purple spots, faintly 4-angled, the angles very obtusely rounded, with fleshy conical very pointed spine-like teeth, faintly furrowed between the rows of teeth; leaves none or composed of a minute bent tip at the apex of the teeth, yellowish-green;

Flowers: borne near the apex of the stems, extra-axillary, in fascicles of 2 to 10, with very short pedicels;

Bracts: minute, triangular, acute, hardly reaching to the calyx;

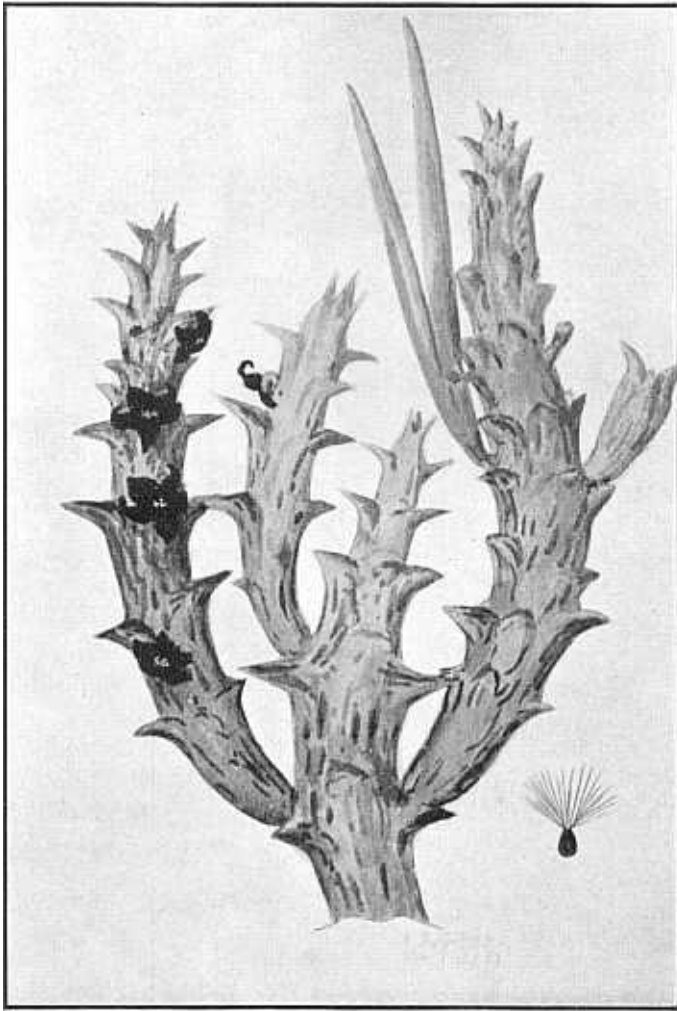


FIG. 202

Caralluma hesperidum Maire x 0.7

From a drawing by Emile Jahandiez, in Revue Horticole, 1923.

Pedice: fleshy, obconical, 1 to 1½ mm. long, shorter than the calyx;

Sepals: fleshy, lanceolate, gradually acuminate with very acute tips, erect-spreading, not reaching to the sinuses between the corolla-lobes, blackish-green, glabrous, alternating with 5 small sharp lanceolate scales;

Corolla: rotate, hardly 2 cm. in diameter, cleft half-way down in 5 lobes; outside glabrous, smooth, greenish and somewhat suffused and mottled with chestnut; inside velvety-papillate, dark brownish-purple, the base of the tube glabrous and yellowish; *lobes* ovate-acuminate, acute, somewhat revolute at the tip and sides, not ciliate;

Outer corona: cup-shaped, subpentagonal, slightly emarginate between the very obtuse angles, almost equaling the corolla-tube, glabrous, purple-brown;

Inner corona: lobes dorsally adnate to the angles of the outer corona, sharply constricted above the middle, the tips obtuse, straight or more rarely slightly bent back, incumbent upon the anthers, purple-brown;

Staminal column: sessile, the upper surface pentagonal, with 5 radiating sections, white; *pollen-masses* almond-shaped, purple-brown with yellow margin;

Follicles: separate from the base, 9 to 10 cm. long at maturity.

Type locality: Morocco: Haha Mts., south of Mogador: Mt. Amsitten.

Distribution: Also in Morocco: near Cap Ghir; Sous: Oued Issen; Torres de Alcalá; Ameskhoud.

The "Caralluma of the Hesperides" was discovered by Dr. René Maire on chalk cliffs in the Haha Mountains of Morocco in April, 1921, and it is the most westerly representative of the "Ango group." Its

name refers to this far western habitat, for the Garden of the Hesperides was in the remote west, at the borders of Ocean, where the sun set over the fabulous distant Atlantis. The plant is closely related to the other members of the group and recently has been considered by Dr. Maire as a subspecies of *Caralluma commutata*. This is a good instance of the convenience of a nomenclature which permits of the use of subspecies; but pending the general adoption of such a system, we must consider the plant as a species or a variety, and the great distance, over 3000 miles, which separates its habitat from that of *C. commutata*, and the differences which exist between the two would seem to warrant retaining *C. hesperidum* as a distinct species. It differs from *C. commutata* in the longer stems, the larger flower-clusters (2 to 10, instead of 1 to 2), the shorter pedicels, the smaller corolla and the corona form. In the outer corona-lobes, there is a slight notch on the margin half-way between the angles, whereas in *C. commutata* it is the angles themselves which are slightly emarginate; in the inner corona, the lobes are not furrowed on the back near the base and they have their tips obtuse.



FIG. 203

Caralluma hesperidum Maire x 1.75

The plant differs still more from *C. sprengeri* in the velvety inner surface of the corolla and in the totally distinct corona form. The evil odor of the flowers has been commented on more than once; yet Emile Jahandiez, who has traveled widely in Morocco, says the natives eat the young stems of the plant, which they call *Darmous*.



FIG. 204

Caralluma hesperidum Maire x 3.5

Flowering stem from Djebel Ouarzemine, Sous, Morocco. Photo taken by the Gattefossé-Barruel expedition, 1934.

54. *Caralluma commutata* Berger, Stap. und Klein., 105. 1910.

Caralluma commutata ssp. *eu-commutata* Maire, Cat. Pl. du Maroc, iii. 581. 1934.

(Description summarized from that of A. Berger, l.c.):

Stems: 10 to 11 cm. high and about 2 cm. thick, erect, 4-angled, glabrous, bright green marbled with red; angles obtusely rounded; teeth 5 to 7 mm. long, ascending-spreading;

Flowers: generally solitary or 2 together, from the upper part of the stems;

Pedicel: 3 to 4 mm. long;

Sepals: $2\frac{1}{2}$ mm. long, acute-lanceolate, glabrous;

Corolla: about 23 mm. in diameter, fleshy, glabrous, lobed to half-way down, with a very shallow tube; inner face brown, rugulose; outside smooth; *lobes* spreading triangular-ovate, with a short point;

Outer corona: bowl-shaped, with 5 bluntly rounded and slightly indented corners;

Inner corona: lobes adnate at the base to the corners of the outer corona, deeply furrowed down the back, spatulate with an abrupt 2-toothed tip incumbent over the anthers.

Type locality: Unknown: perhaps from Southern Arabia: Menacha?

Distribution: Unknown.

A plant of uncertain origin, first noticed in the garden of the Medical School in Cairo about 1895 and believed to have been introduced there by Prof. Schweinfurth from Southern Arabia. The strongly toothed and mottled stems closely resemble those of *Caralluma sprengeri*, but the flowers differ completely in the corona form and the corolla lobes are not as deeply in-

dent. Deflers thought the plant might be identical with *C. aaronis*, and Berger supposed it (or else *C. sprengeri*) might prove to be the imperfectly known *C. angö*. This confusion in the identification of the species was finally straightened out when Berger assigned it to a new species, of which the name *C. commutata* can be translated as the "mixed-up *Caralluma*."

55. *Caralluma schweinfurthii* Berger, Stap. und Klein., 103. 1910.

(Description summarized from that of A. Berger, l.c., translated from the German):

Stems: erect, probably 5-angled, about 8 to 9 cm. long and up to 1 cm. thick excluding the teeth, glabrous; teeth directed upwards at their pointed tips;

Flowers: several, in small umbels near the top of the stems;

*Pedice*l: 3 mm. long, erect, stout, glabrous;

Sepals: acute, 2 to 2½ mm. long;

Corolla: rotate, up to 16 mm. in diameter, lobed to slightly more than half-way down; *lobes* ovate-acute, pointed, 6 mm. long and 4 mm. broad, glabrous outside, brownish on inner face, delicately papillate, otherwise glabrous and not ciliate;

Outer corona: forming a flat 5-cornered star-shaped disk, the outer edges minutely toothed;

Inner corona: lobes dorsally adnate to the outer corona, the tips incumbent on the anthers, obtuse or pointed.

Type locality: Belgian Congo: Itande: Nswiwa.

Distribution: Not further known.

Discovered by Dr. Franz Stuhlmann, a member of the last expedition of Emin Pasha to the Congo in 1890-92. He collected it on May 9, 1891, at an altitude of 2800 feet, near Nswiwa. This is in latitude 8 degrees south of the Equator, only 3 degrees south from Stanley's "great forest" of the Upper Congo, which would naturally be the last region where one might expect to find any Stapeliad. However, even this short further recession from the Equator, combined with a moderate elevation, produce a very material modification in the vegetation as compared with conditions in

the rain forest. The plant resembles *C. sprengeri* in its stems, though if these are uniformly 5-angled, as suggested in the description, they would be immediately recognizable. The brownish flowers are somewhat smaller than those of *C. sprengeri*, and they have a particularly beautiful outer corona, resembling a star-shaped disk, minutely toothed all around the margins of the segments and more deeply colored at the centre than on the tips. Berger dedicated the species to Prof. Schweinfurth, who preserved Stuhlmann's specimen in his herbarium.

56. *Caralluma chlorantha* Schlechter, Engler: Jahrb., xviii. Beibl. 37. 1894.

(Description by Dr. N. E. Brown, Flora Cap., iv. i. 886):

Stems: decumbent, about $1\frac{1}{2}$ in. long and 5 lin. thick, obscurely 6-angled or with obscurely 6-seriate tubercles;

Flowers: solitary or rarely in pairs;

*Pedice*l: 4 to 5 lin. long, stout, glabrous;

Sepals: 1 lin. long, triangular-lanceolate, very acute, glabrous;

Corolla: campanulate, with a short tube, green; *lobes* erectly-spreading, $\frac{1}{4}$ in. long, linear-lanceolate, flat, somewhat hooked at the obtuse apex, glabrous on the back, densely pilose on the inner face;

Outer corona: white, shortly cup-shaped, 5-sulcate, with free subdivaricate lobes, shortly notched at the truncate apex;

Inner corona: lobes shorter than the staminal column, fleshy.

Type locality: Cape Prov.: George Distr.: Karroo near Klip Drift, 1800 feet elevation.

Distribution: Not further known.

A singular and imperfectly known species, collected by Dr. R. Schlechter in the Little Karroo, March 7, 1893. The half-inch flowers are campanulate with a short central tube, the corolla-lobes erectly spreading, very slender and densely pilose on the inner face. Their color was not stated by Dr. Schlechter, but the name of

the species, the "green-flowered *Caralluma*," gives a sufficient hint! The stems are described as obscurely 6-angled or with six obscure rows of short tubercles. If the plant is rediscovered it may prove that the stem-angles are tessellate, in which case it should perhaps be more properly classified as an *Echidnopsis*.

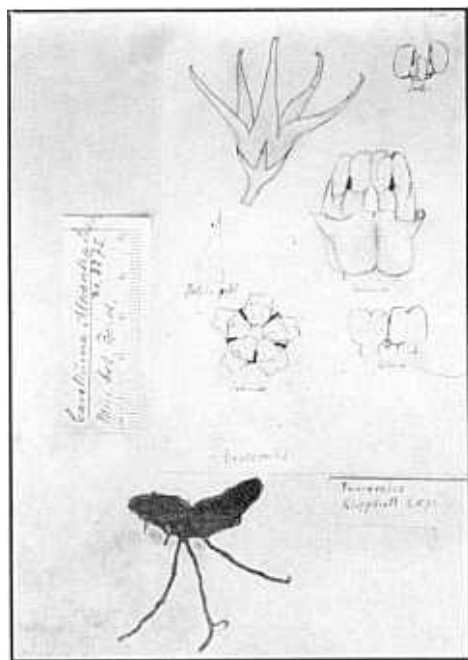


FIG. 204-A

Caralluma chlorantha Schlechter

From a photograph of the type specimen in the Herbarium of the Berlin-Dahlem Botanic Museum.

57. *Caralluma framesii* Pillans, So. Afr. Gard., xviii. 62. (Special reprint). 1928.

(Description by N. S. Pillans, l.c., translated from the Latin) :

Plant: about 20 cm. high, widely branched; *stems* 4 to 6-angled, $1\frac{1}{2}$ to 2 cm. in diameter excluding the teeth, glabrous, dull green tinged with purple, becoming grey or pale purple-grey with age; angles vertical or more rarely in part spirally twisted, rounded; teeth horizontal or slightly recurved, conical, stout, acute, about 3 mm. long, with hardened tips;

Flowers: several in a cyme, developed successively;

*Pedice*l: 1 to 4 mm. long, spreading, glabrous;

Sepals: $1\frac{1}{2}$ to $1\frac{3}{4}$ mm. long, lanceolate, acute, glabrous;

Corolla: when expanded 16 to 18 mm. in diameter; *tube* $2\frac{1}{2}$ mm. long, 3 mm. in diameter, campanulate, outside glabrous, inside pale yellow, with simple ascending yellow hairs, glabrous at the base; *lobes* 7 to 8 mm. long, $1\frac{1}{2}$ to 2 mm. broad when flattened out by hand, erect-spreading, oblong, acute or obtuse, convex above, with the edges at the middle slightly recurved, outside glabrous, lemon-yellow, inside canary-yellow, smooth, at the base pubescent with simple ascending grey hairs up to 5 mm. long;

Outer corona: lobes inconspicuous, forming a little pouch with a small erect-spreading mouth;

Inner corona: lobes incumbent on the anthers and equal to them in length, oblong, slightly widened at the apex, truncate, shortly toothed;

Staminal column: and corona golden, suborbicular, 2 mm. high.

Type locality: Cape Prov.: Van Rhynsdorp Distr.: without precise locality.

Distribution: Not further known.

"Frames' *Caralluma*" was discovered by P. Ross-Frames of Kenilworth, about 1926, in the west coast region of the Cape, some 150 miles north of Capetown. It is described as nearly allied to *Caralluma incarnata*, from which it differs chiefly in having more angular stems and larger yellow flowers. The outer corona is inconspicuous, each lobe forming a pouch with a small upturned radiating slit-like mouth.

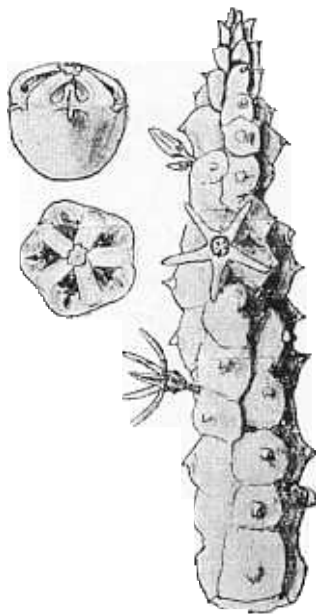


FIG. 205

Caralluma framesii Pillans x 1.

from a drawing by L. Guthrie, in South African Gardening and Country Life, 1928.

58. *Caralluma winkleri* (Dinter), comb. nov.

Sarcophagophilus winkleri Dinter, Succ.-Forsch. Süd.-Afr., i. 78. 1923.

Sarcophagophilus winklerianus Dinter, Sukk.-Forsch. Süd.-Afr., ii. 54. 1928.

?*Caralluma namaquana* Welwitsch, ex Jacobsen: Succulent Plants, 269, false *namaquanum*. 1935.

(Description based on text of Prof. K. Dinter, l.c., translated from the German):

Plant: branching from a single rooted stem, robust, 5 to 6-angled, with stout conical teeth ending in a hard spine-like tip, not distinguishable from *Caralluma armata* when out of flower;

Corolla: similar to that of *C. armata*; but larger, 18 mm. in diameter (instead of 12 mm. ?); lobes lanceolate, flat, the margins bent back on the lower $\frac{1}{3}$; with distinct erect hairs at the base within, not glabrous as in *C. armata*;

Outer corona: 2 mm. long; lobes 2-toothed, not truncate;

Inner corona: lobes linear, arising from between the two teeth of the corresponding outer corona-lobes, incumbent on the anthers.

Type locality: South West Africa: Klinghardt Mountains: on the Sargdeckel.

Distribution: Also recorded 4 miles north of the Orange River, near Sendlingsdrift.

Prof. Dinter has written a very interesting account of the discovery of this species, Sept. 17, 1922, in the Klinghardt Range of South West Africa on the Sargdeckel (Coffin Lid Mountain, from which he coined the new generic name, *Sarcophagophilus*,

proposed for the species). "An ascent of the Sargdeckel proved to be a grand success. On the ridge of it—almost a plateau, of 500 meters length and 40 meters breadth—we found a single-stemmed Stapeliad with an extremely strong ramification. The end branches are short, only one to two inches long, almost one inch thick and with very stout and strong, grey-tipped thorns without any trace of rudimentary leaves. There were scores of fallen flowers, but not a single fresh flower. Advancing, we found more of it, including specimens of two feet in diameter and one foot high, with many, nay, thousands of fruits, but only a single ripe one, which contained about 80 seeds in both follicles. We counted the specimens from one end of the plateau to the other and found more than 300, some of them weighing a hundredweight. Never before had I seen a Stapeliad growing so thickly and never a well-defined area so exclusively occupied by a single species. Although flowers could not be collected the whole appearance of my plant was so strange and unique that I did not hesitate to give it the new generic name of *Sarcophagophilus*. We filled a large bag with about a dozen of the smallest specimens we could find." The species cannot be dis-

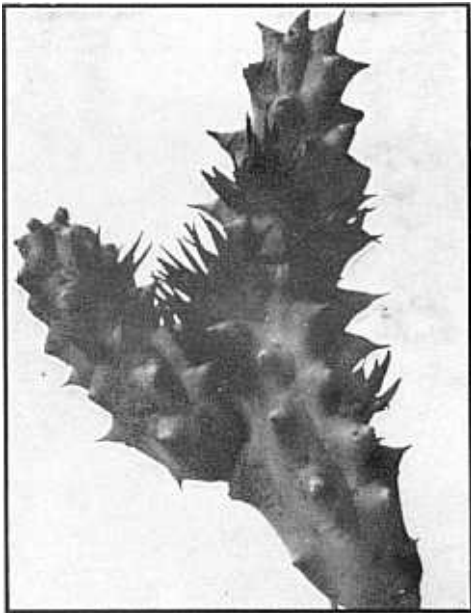


FIG. 206

Caralluma winkleri, comb. nov.

Photo by E. Rusch, Jr., of a flowering stem collected in Great Namaqualand, about 4 miles north of the Orange River, near Sendlingsdrift.

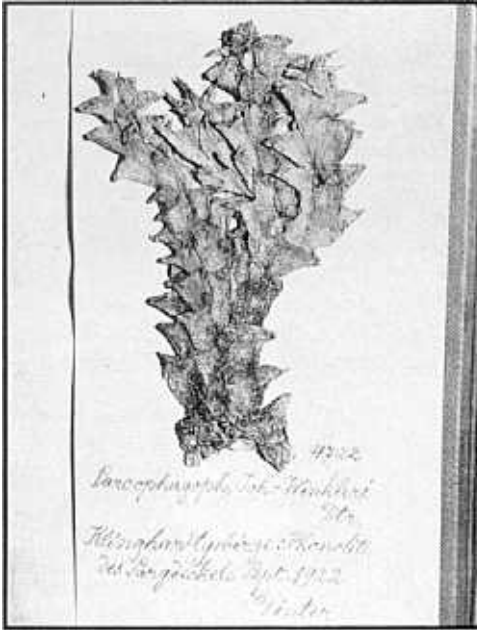


FIG. 207

Caralluma winkleri, comb. nov.
From the Herbarium of Prof. Dinter.

tinguished from *Caralluma* because of any detail in the flower structure and the plant stems, which are identical with *Caralluma armata*, are also very closely allied to those of *Caralluma mammillaris*, though Prof. Dinter believes that they are distinguished by the fact that the sap is not colorless, but thinly milky. It is true that *Echidnopsis* and *Trichocaulon* are separated from *Caralluma* because of their stem forms only; but among the 4 to 6-angled *Carallumas* stem forms seem to overlap in too many details to afford satisfactory bases in erecting new genera, and we have therefore decided to unite the species to *Caralluma*. The specific name was given in honor of Dr. Hans Winkler, director of the Botanical Gardens in the University of Hamburg, famous for his investigations in the field of plant chimeras or graft-hybrids.



FIG. 208

Caralluma winkleri, comb. nov.

From a photograph by Prof. Dinter of a large plant, weighing approximately 125 lbs., in natural surroundings in the Buchberge, on the desert coast belt south of Lüderitz Bay, South West Africa, 1929.

59. *Caralluma armata* N. E. Brown, Icon. Pl., t. 1902. 1890.

Sarcophagophilus armatus Dinter, Sukk.-Forsch. Südwest-Afr., ii. 107. 1928.

(Description by Dr. Brown, Flora Cap., iv. i. 876):

Plant: robust, branching; *branches* 4-angled, $\frac{3}{4}$ to 1 in. square exclusive of the teeth, glabrous; *teeth* $\frac{1}{3}$ to $\frac{1}{2}$ in. long, stout, conical, with hard spine-like tips, horizontal or slightly recurved;

Flowers: in clusters of 8 to 10 (or more?) along the grooves between the angles of the branches, several open together;

*Pedice*l: 2 lin. long, stout;

Sepals: $\frac{1}{8}$ in. long, lanceolate, acuminate;

Corolla: *tube* about $\frac{1}{8}$ in. long, campanulate, greenish-yellow; *lobes* $\frac{1}{3}$ in. long, about 2 lin. broad, somewhat spreading, lanceolate, acute, with the margins folded back, glabrous and not ciliate, greenish-white on the back, dark purple-brown or blackish-purple on the apical half of the inner face and greenish-yellow dotted with purple on the basal half;

Outer corona: about equaling the staminal column, cup-shaped, subtruncate, with 5 slight and broad erose crenations opposite and raised above the base of the inner corona-lobes and 5 pairs of minute teeth alternating with them, alternately blackish-purple and purple-brown in color;

Inner corona: lobes linear-oblong, notched at the apex, closely incumbent on the anthers and not produced beyond them.

Type locality: Cape Prov.: Little Namaqualand: at the foot of the Kamiesberg Range.

Distribution: Also from South West Africa: Great Namaqualand: Wittsand; Eendorn.

The "armored *Caralluma*" is a very strongly toothed species. We believe the specification of 4-angled stems in the description is a slip, for Dr. Brown wrote in Hooker's *Icones Plantarum* that the stems are just like those of *C. mammillaris* and the flowers clustered in the same way. *C. mammillaris* has 5 to 6-angled stems. The flowers are very dark purple at the tips of the corolla-lobes, becoming greenish-yellow with purple dots lower down. They are smaller than the flowers of *C. mammillaris*, with much longer pedicels and they have a different corona. The outer corona is deeply cup-shaped, with its rim broadly crenate at the points corresponding with the base of the inner corona-lobes and minutely toothed at the intermediate points. The inner corona-lobes bend over the anthers and are not produced above them, as they are in *C. mammillaris*. Discovered at the foot of the Kamiesberg Range in Little Namaqualand in Sir Henry Barkly's time. More recently collected 15 miles north of the Orange River in South West Africa, a little south-east of Warmbad, by Prof. Dinter.

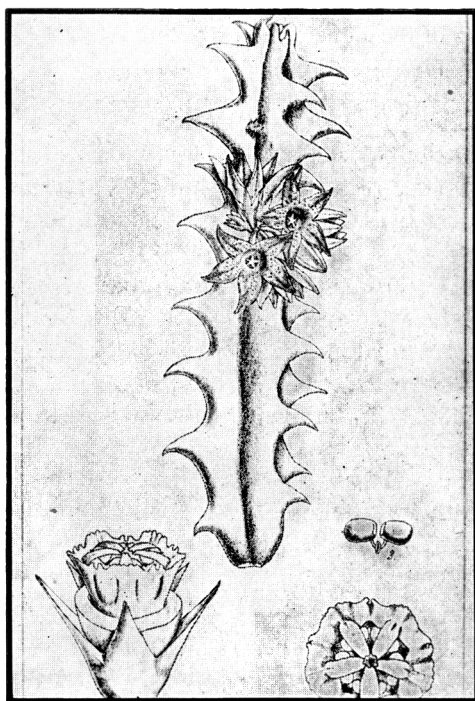


FIG. 209

Caralluma armata N. E. Brown x 0.75

From Hooker's *Icones Plantarum*, 1890.

60. *Caralluma mammillaris* (Linnaeus) N. E. Brown, Icon. Pl., sub t. 1902 1890.*Stapelia aphylla* &c. Burman, Rar. Afr. Pl., 27. 1738.*Stapelia mammillaris* Linnaeus, Mant. Pl., ii. 216. 1771.*Stapelia pulla* Aiton, Hort. Kew., 1 Ed., i. 310. 1789.*Piaranthus pullus* R. Brown, Mem. Wern. Soc., i. 23. 1811.*Pectinaria mammillaris* Sweet, Hort. Brit., 2 Ed., 357. 1830.*Piaranthus mammillaris* G. Don, Gen. Hist., iv. 114. 1838.*Boucerosia mammillaris* N. E. Brown, Journ. Linn. Soc., xvii. 165. 1878.

(Description by Dr. Brown, Flora Cap., iv. i. 875):

Plant: $\frac{1}{2}$ to $1\frac{1}{2}$ ft. high, branched in a bushy manner; *branches* $\frac{3}{4}$ to $1\frac{1}{2}$ in. thick, irregularly or spirally 5 to 6-angled, armed with stout conical hard-pointed acute spines $\frac{1}{4}$ to $\frac{1}{2}$ in. long, glabrous, light green, faintly glaucous, with the apical half of the spines brown;

Flowers: in fascicles of 4 to 10 or more, along the grooves between the angles;

Pedice: 1 to $1\frac{1}{4}$ lin. long, glabrous;

Sepals: 1 lin. long, ovate, acuminate, glabrous;

Corolla: glabrous and pale green outside, with the tips, margins and a stripe down the middle of the lobes and some dots on the tube very dark purple-brown; inside minutely papillate-setulose on the lobes and upper part of the tube, rich velvety black-purple on the lobes, pale yellowish dotted with blackish-purple in the tube, which is 2 to 3 lin. long and as much in diameter; lobes erectly spreading, 7 to 9 lin. long, about 2 lin. broad at the base, thence gradually tapering to a very acute apex, longitudinally folded, with revolute margins;

Outer corona: about as long as the staminal column, cupular, 10 to 15-toothed, glabrous, dark purple-brown;

Inner corona: lobes $\frac{1}{2}$ to $\frac{2}{3}$ lin. long, subulate or linear, acute to truncate, incumbent on the backs of the anthers and exceeding them, with more or less connivent-erect tips and a short dorsal projection at the base, adnate to the outer corona and forming 5 of its teeth, dark purple-brown.

Type locality: South Africa: without precise locality.

Distribution: Cape Prov.: widely distributed in the westerly sections: Oudtshoorn; Prince Albert; Laingsburg; Worcester; Ceres; Clanwilliam; and Van Rhynsdorp districts; and Little Namaqualand, including the Richtersveld.

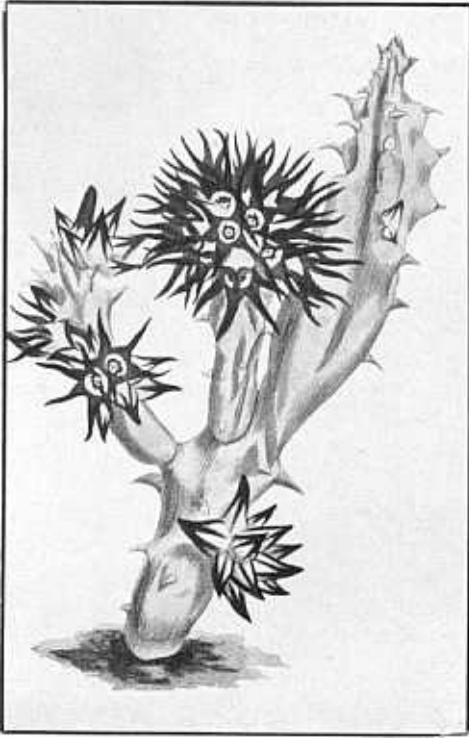
The "mammillary *Caralluma*" was one of the very early *Stapeliads* in cultivation (see Appendix B). Burman had a drawing of it in his *Decades of Rare African Plants*, 1738; and Linnaeus described it in the *Mantissa Plantarum*, 1767-1771. It is widely distributed, from the westerly part of the Karroo to Little Namaqualand. The plant grows to a foot and a half high, branching in a bushy manner. The stems have five or six irregular, often spiral, angles, powerfully armed with hard-pointed spines. The flowers form in



FIG. 210

Caralluma mammillaris N. E. Brown x 0.33

Photo by R. H. Compton.



clusters of 3 to 20 individuals at the sides of the stems. They are a rich velvety purple-black in color, with the central tube pale yellow dotted with purple. The corolla-lobes are erectly-spreading and folded back along the margins, which makes them look very slender and gives the flowers a distinctive appearance. The outer corona is deeply cup-shaped, the base of the cup in five continuous lobes, terminated at the upper edge by two sharp triangular teeth. A third smaller tooth, which appears to cap the indented demarcations between the outer corona-lobes, is actually a dorsal projection from the inner corona-lobes. The main horns of the inner corona-lobes are incumbent over the anthers and then produced above them in an erect little group.

FIG. 211

Caralluma mammillaris N. E. Brown x 0.5

From Curtis's Botanical Magazine, 1814.

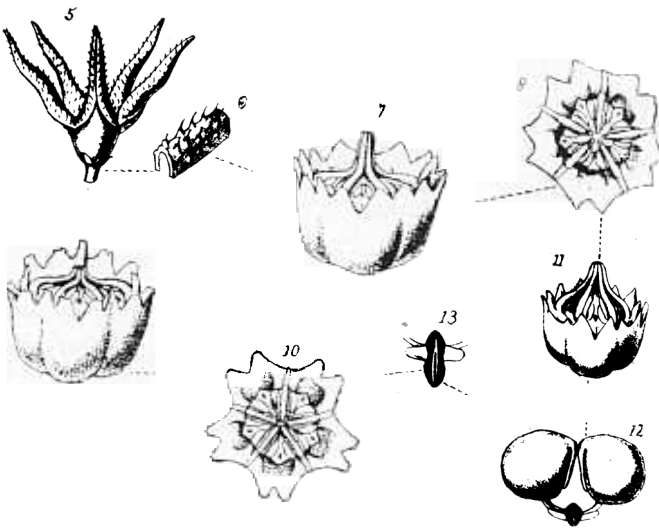


FIG. 212

Caralluma mammillaris N. E. Brown (5) x 1

From Journal of the Linnean Society, 1878.

61. *Caralluma longipes* N. E. Brown, Flora Cap., iv. i. 887. 1909.

(Description by Dr. Brown, l.c.):

Stems: or branches decumbent or procumbent, $\frac{3}{4}$ to $1\frac{1}{4}$ in. long, 3 to 7 lin. thick, 5 to 6-angled, with small tubercle-like conical teeth 1 to $1\frac{1}{2}$ lin. long along the angles of the young branches, becoming minute and distant with age (*Marloth*), glabrous, dull green;

Flowers: 1 to 2 together, between the angles at about the middle of the stems, successively developed;

Pedicel: 1 to $1\frac{1}{4}$ in. long, erect, very slender, less than $\frac{1}{2}$ lin. thick, glabrous;

Sepals: about 1 lin. long, ovate, acute or acuminate, glabrous;

Corolla: about $\frac{1}{2}$ in. in diameter, flat, without a distinct tube, but with a depression in the disk containing the corona, smooth, quite glabrous and not ciliate; *lobes* widely spreading, 2 to $2\frac{1}{3}$ lin. long, $1\frac{1}{2}$ lin. broad, ovate, acute, flat, pale dull yellow with green tips (*Marloth*);

Corona: consisting of 5 pairs of minute slender parallel teeth, with a small pocket-like cavity in front of them, alternating with 5 stout transversely rectangular partition-like bodies (really the *inner corona-lobes*), truncate and minutely denticulate on their dorsal margin, truncate on their inner margin and not reaching half-way up the backs of the anthers, orange.

Type locality: Cape Prov.: Sutherland Distr.: on the Roggeveld, near Sutherland.

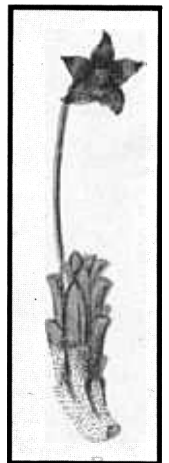
Distribution: Not further known.

The "long-legged *Caralluma*" was discovered by Dr. Marloth on the Roggeveld about 1905, but has not been collected since. The procumbent stems are only an inch long, 5 to 6-angled, with small tubercle-like teeth. The $\frac{1}{2}$ -inch flowers, pale dull yellow with green tips, are borne on long slender pedicels, an inch or more in length, which give the species its name. The orange corona is intergrown so as almost to form a single series, the outer corona-lobes of two parallel teeth with a pouch-like cavity in front of them alternating with the inner corona-lobes, which consist of minute rectangular partition-like scales.

FIG. 213

Caralluma longipes N. E.
Brown x 1.

From a drawing by E. Dixie and
E. Smith, in R. Marloth: Flora of
South Africa, 1932.



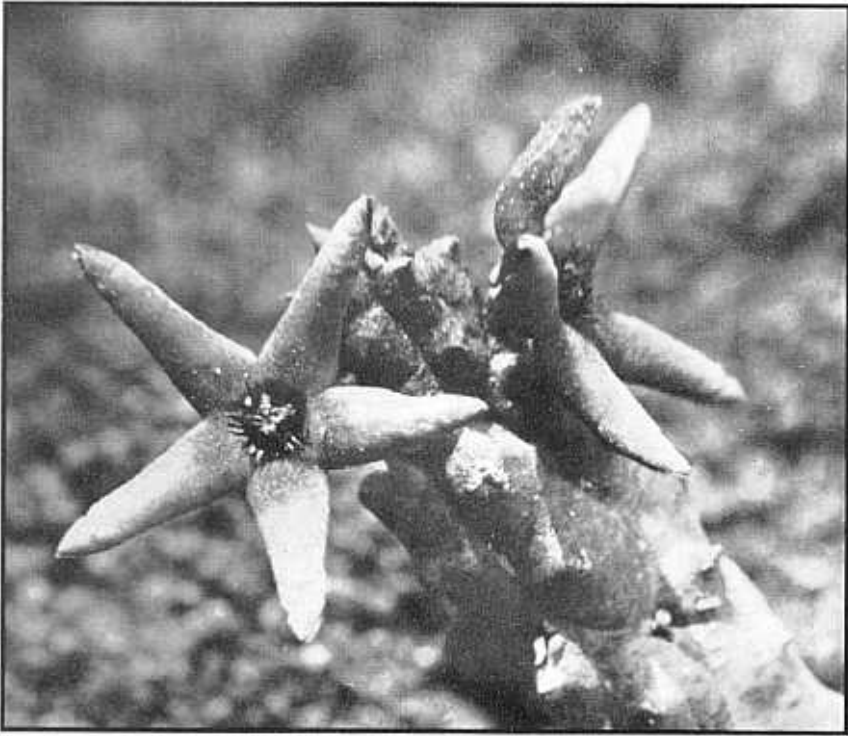


FIG. 214

Caralluma maughani R. A. Dyer. x 3.5

From Nieuwoudtville, C. P. Photo by Carl Luckhoff.

62. *Caralluma maughani* R. A. Dyer, Rec. Alb. Mus., iv. 115. 1931.

(Description by Mr. Dyer, l.c.):

Stems: tufted, branched at the base, up to 7 cm. high, 1 to 1½ cm. in diameter including the teeth, 6-angled, with spreading hard pointed teeth 2 to 3 mm. long on the angles, glabrous, green;

Flowers: 1 to 2 together near the apex of the stems;

Pedicel: 6 mm. long, slender, erect, glabrous;

Sepals: 2 mm. long, lanceolate, extending to the sinuses of the corolla-lobes, glabrous;

Corolla: 14 to 16 mm. in diameter with a very shallow tube; *lobes* unequal in the same flower, 5 to 7 mm. long, with the margins strongly revolute, glabrous, mustard-yellow on the top three-quarters of the lobes and the remainder reddish-purple;

Outer corona: combined with the base of the inner corona-lobes, shortly cupular at the base extending into 5 delicate erect bifid lobes 1 mm. long, glabrous, blackish;

Inner corona: with the lobes closely incumbent on the backs of the anthers, emarginate at the apex, dorsally produced into a short horizontally spreading trifid crest, blackish.

Type locality: Cape Prov.: Van Rhynsdorp Distr.: near Nieuwoudtville.

Distribution: Not further recorded.

This *Caralluma* is named for its discoverer, Dr. R. Maughan-Brown, who collected it during September, 1928, in the

Bokkeveld karroo veld area, 50 miles or so north of Clanwilliam. It is a distinctive tufted plant, the 3-inch stems with 6 angles

and spreading hard pointed teeth. The $\frac{2}{3}$ -inch flowers have a shallow tube, the corolla-lobes deeply cleft with the margins strongly revolute, mustard-yellow on the upper three-quarters of the lobes, the remainder reddish-purple. The corona is

blackish; the outer corona cup-shaped and extended to 5 delicate bifid lobes; the inner corona-lobes are incumbent on the anthers and dorsally produced into a short trifid crest which forms a connection with the outer corona.

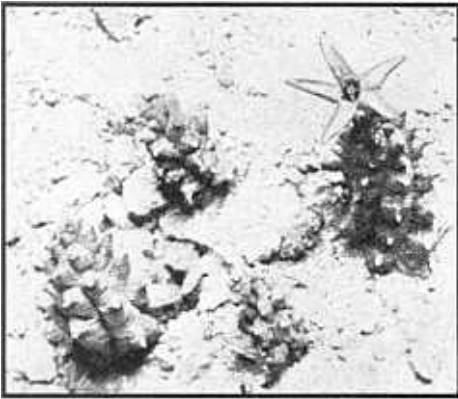


FIG. 215

Caralluma maughani R. A. Dyer x 0.8

Photo by Dyer in Rec. Albany Mus., 1931.

63. *Caralluma piaranthoides* Obermeijer, Flow. Pl. So. Afr., t. 599. 1935.

(Description by Miss A. A. Obermeijer, l.c., in part translated from the Latin):

Stems: single or branching from the base, erect, up to 10 cm. high, 4-angled; teeth 1.5 cm. long, curved, tapering to the apex, with two minute teeth below the apex;

Flowers: 2 to 5, near the apex of the stems;

Pedicel: 4 mm. long;

Sepals: 3 mm. long, acute;

Corolla: in bud compressed, rounded, obtuse; when expanded rotate, about 1.5 cm. in diameter, greenish with a few scattered red spots and glabrous without, yellow spotted with wine-red and tuberculate and papillate within; *lobes* triangular, acute;

Corona: slightly convex, in a shallow depression of the corolla (visible only in cross-section);

Outer corona: lobes 5, appearing 10-lobed, irregularly toothed, cream-colored, minutely spotted with red;

Inner corona: lobes closely incumbent on the anthers, often 2-toothed, broadly connected at the base to the outer corona.

Type locality: Southern Rhodesia: Wankie Distr.: near Wankie.

Distribution: Also from near Matetsi.



FIG. 216

Caralluma piaranthoides Obermeijer x 3.

Photo by Herbert Lang of the type plant.

This interesting small-flowered *Caralluma* was discovered about 1933 by B. Levy in the Wankie district of Southern Rhodesia, growing on fireclay deposit at the foot of a tree with hardly any shelter from bushes. It has also been collected by Capt.

R. H. R. Stevenson under a large baobab tree near Matetsi. The stems are of semi-trailing habit, with long curving teeth bearing small denticles below the apex, after the fashion of *Stultitia tapscottii*. The flowers in general appearance recall those

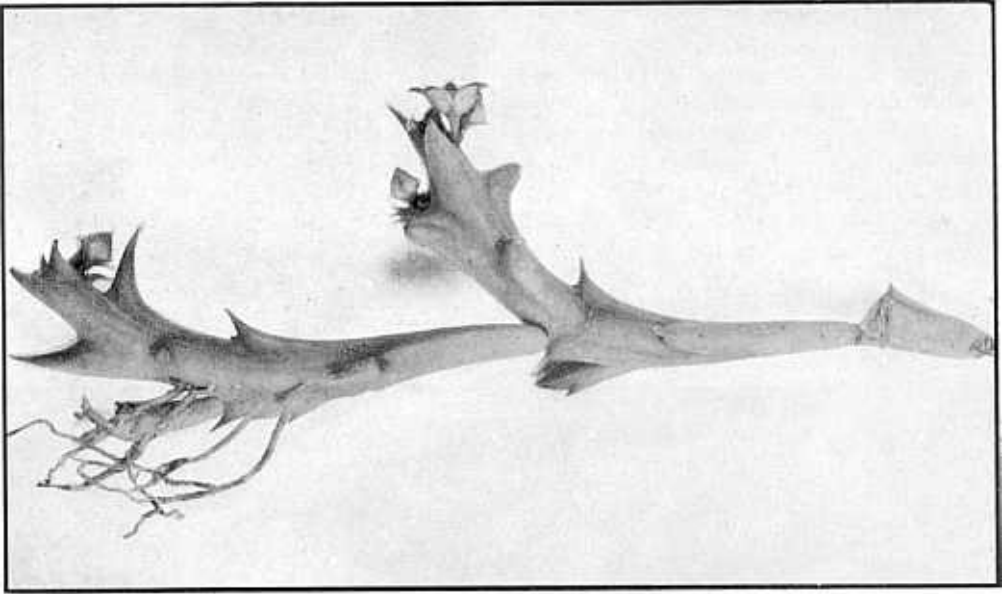


FIG. 217

Caralluma piaranthoides Obermeijer x 1.

Photo by R. H. R. Stevenson of the semi-trailing stems of a plant from Wankie, Southern Rhodesia.



PLATE II.

Caralluma piarantoides Obermeijer

from a water color drawing by Dr. George Arnold.

of *Piaranthus geminatus*, and it is from this circumstance that they received their name. They are about half an inch in diameter, with a shallow central tube containing the corona, the corolla yellowish on the inner face with wine-red spots. The outer corona is very distinctive, the lobes bifid and irregularly and minutely toothed all along their edges, so that the outer corona as a

whole resembles a rough circular comb, a little in the manner of the outer corona of *Pectinaria asperiflora*. The inner corona-lobes arise from the margin of the outer corona between its lobes, and then bend in over the anthers. They have no dorsal gibbosity, as do the inner corona-lobes of *C. marlothii*, *C. carnosae* and some others of the small-flowered *Carallumas*.



FIG. 218

Caralluma piaranthoides Obermeijer x 3.

Photo by Carl Luckhoff.

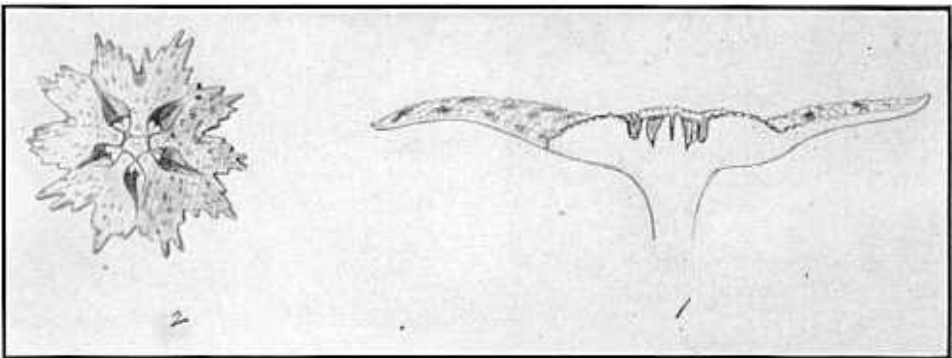


FIG. 219

Caralluma piaranthoides Obermeijer

Enlargement of the corona and of a cross-section of the corolla, from a drawing by Miss Cythna Letty in the Flowering Plants of South Africa, 1935. The annular thickening of the corolla-disk is a striking feature, suggesting possible kinship to the *Stultitias*.

64. *Caralluma carnosa* Stent, Kew Bull., 42. 1916.

(Description by Miss S. M. Stent, l.c., translated from the Latin):

Stems: erect or ascending, branched and decumbent at the base, 6 to 15 cm. high, up to $4\frac{1}{2}$ cm. thick, slightly narrowed above, glabrous, greyish-green with purple-brown markings, 4-angled; angles with spreading acute teeth, hardened at the apex, up to $1\frac{1}{4}$ cm. long;

Flowers: 1 to 3 together, irregularly disposed between the angles;

Pedicel: 1 to 2 mm. long;

Sepals: ovate, acuminate, 4 mm. long, glabrous, with the margins membranaceous, greenish-yellow, indistinctly marked with lilac within;

Corolla: in bud subglobose, the angles produced in 5 teeth; when expanded 7 to 9 mm. long, 8 to 10 mm. in diameter, campanulate, fleshy, greenish-lilac, outside indistinctly marked in purple, inside deep cream color, densely papillose-verrucose, spotted with dark purple, with the spots smaller in the very distinct *tube*; *annulus* pentagonal, cushioned, prominently furrowed; *lobes* deltoid, acute, rigidly erect, 5 mm. long and equally broad at the base,

Outer corona: crater-shaped, 3 mm. long, exceeding the staminal column; lobes cream color with purple spots, adnate laterally to the inner corona-lobes;

Inner corona: lobes strap-shaped, thickly gibbous at the back, incumbent on the anthers and not exceeding them, 1 mm. long, cream color with purple spots, the spots occasionally confluent into a purple line at the margins.

Type locality: Transvaal: Pretoria Distr.: Magaliesberg Range: Zilikats Nek.

Distribution: Also recorded from Rustenburg Distr.: Kransberg; near Olifants Nek; Potgietersrust Distr.: near Zaaipplaats Tin Mine.

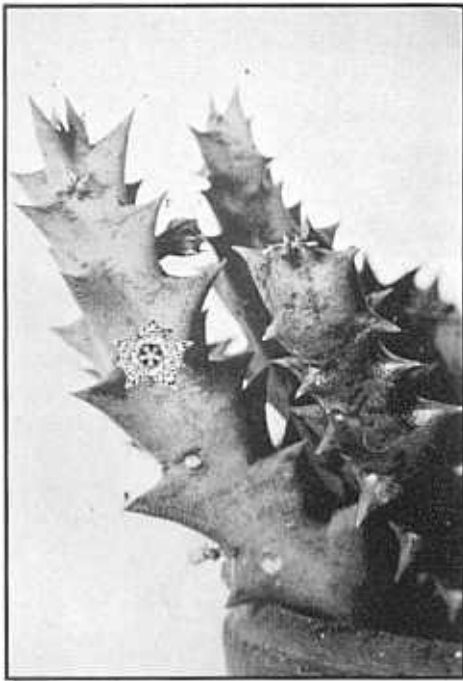


FIG. 220

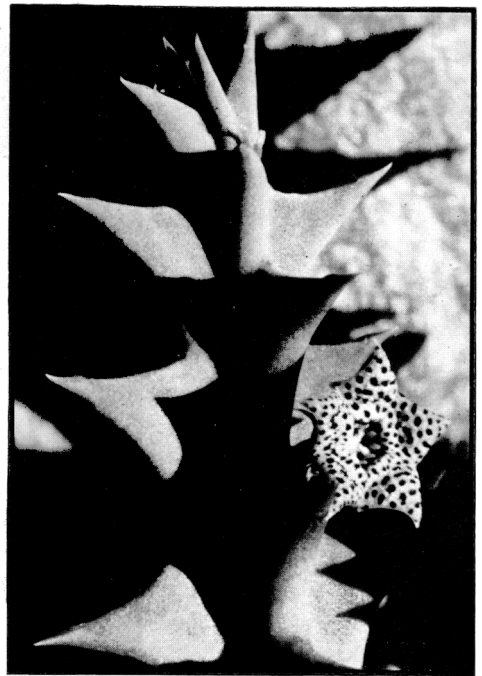
Caralluma carnosa Stent x 1.

FIG. 221

Caralluma carnosa Stent x 2.

Photo by Herbert Lang. Note how the corona is partially hidden by the swollen irregularly spotted hexagonal annulus, contrasting with the normal way in which the corona may be seen in the flowers of *C. schweickerdii*.



PLATE III.

Caralluma carnososa Stent

From the original water color drawing by Miss Cythna Letty
for the Flowering Plants of South Africa, 1935.

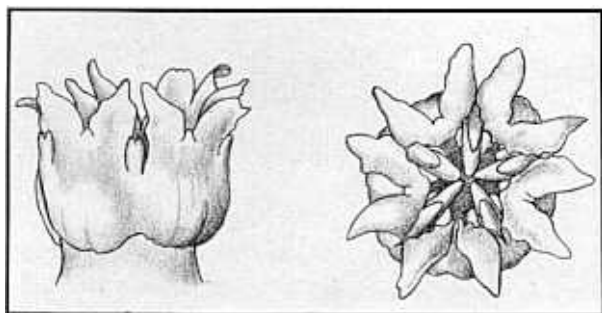


FIG. 222

Caralluma carnosa Stent

Enlargement of the corona, from a drawing by Miss Cythna Letty in the Flowering Plants of South Africa, 1935.

The "fleshy *Caralluma*" is a plant with stems up to about two and a half inches in the open. In "captivity" elongated stems well over 6 inches long will be found. The stems bear acute teeth, with minute denticles a little below the apex. The species gets its name from the thick texture of the corolla fabric. The flowers are like tiny fleshy bells, averaging a third of an inch in diameter, cream colored inside with dark purple markings. The distinct corolla-tube is raised at the throat to an inconspicuous pentagonal cushioned annulus. The whole tube is occupied by the characteristic cupular outer corona, with deeply bifid lobes.

C. carnosa was discovered by Dr. I. B. Pole Evans at Zilikats Nek, 20 miles west of Pretoria, prior to 1914. Zilikats Nek, a pass through the Magaliesberg Range, marks the spot where the Zulu tribesmen of Mosilikatse were defeated in a four days' engagement in November, 1837, by the first large party of immigrants into the Trans-

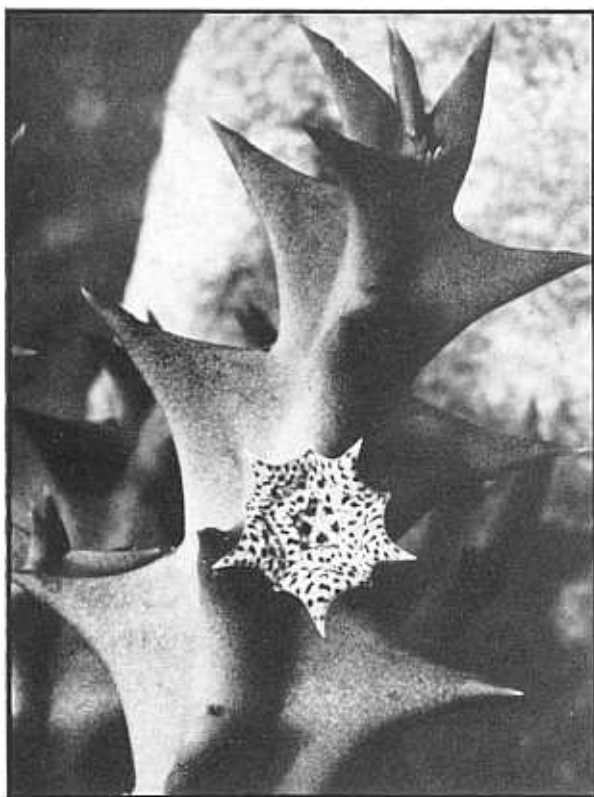


FIG. 223

Caralluma carnosa Stent x 2.5

Photo by Herbert Lang.

vaal at the time of the Great Boer Trek.

65. *Caralluma keithii* R. A. Dyer, Flow. Pl. So. Afr., t. 600. 1935.

(Description by Mr. Dyer, l.c.):

Plant: a dwarf succulent branched at the base; *branches* erect or spreading, 7 to 9 cm. high, 3 to 4.5 cm. broad including the teeth, glabrous, bluish-green, mottled with reddish-brown, 4-angled; angles with alternate, spreading teeth; teeth sharply pointed, 1 to 1.5 cm. prominent;

Flowers: 1 to 3 together, irregularly placed between the angles, opening successively;

*Pedice*l: about 2 mm. long;

Sepals: lanceolate, acuminate, 5 mm. long;

Corolla: about 1.25 cm. in diameter when open; *tube* campanulate, minutely verrucose, with a raised 5-angled annulus (more prominent at the centre of the base of the lobes), purplish; *lobes* deltoid-ovate, acute, 5 mm. long, 6 mm. broad, slightly spreading, folded into minute points in the sinuses, verrucose, moderately covered with short and long papillae-like hairs and a few fixed clavate or capitate hairs towards the sinuses, and with a row of minute hairs slightly within the margin, dark purplish-red with a few whitish spots;

Corona: parchment-colored, lightly stained with red;

Outer corona: crater or cup-like, 5-lobed, each lobe deeply bifid, thus apparently 10-lobed, with or without a minute point in the sinuses;

Inner corona: 5-lobed, attached on the back to the outer corona; lobes slightly exceeding the anthers, gibbous on the back and each with a minute emarginate lobe, 0.5 mm. long, spreading slightly between the outer corona-lobes.

Type locality: Swaziland: about 20 miles from Stegi in the Ubombo Mountains.

Distribution: Not otherwise known.

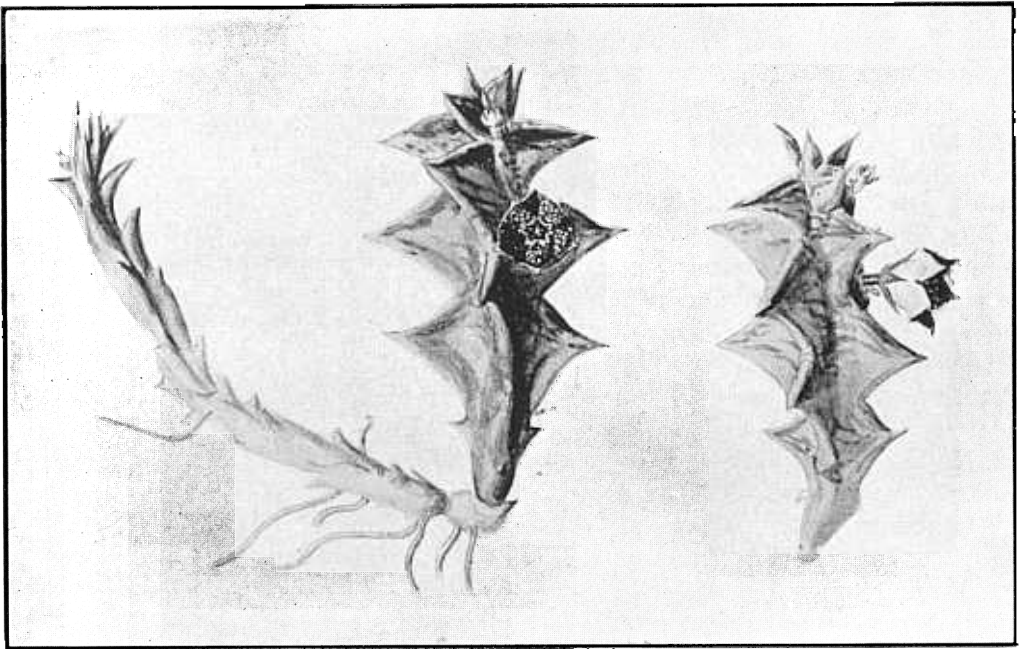


FIG. 224

Caralluma keithii R. A. Dyer x 1.

From the original water color drawing by Miss Cythna Letty for the Flowering Plants of South Africa, 1935.

"Keith's *Caralluma*," from the Ubombo district of Swaziland, is named for its discoverer, D. R. Keith, who collected it about 1934 some 20 miles from Stegi. In its natural surroundings, it flowers in the latter half of the summer, from February to April. The small bell-shaped flowers resemble those of *Caralluma carnosa*, notably so in having minute points at the sinuses between the corolla-lobes, after the fashion of the genus *Huernia*. But the corona is wholly foreign to the *Huernia* tradition. The cup-like outer corona, overtopping the staminal column, again recalls *C. carnosa*. The inner corona-lobes, however, are quite distinct. The corolla differs in several respects. The color scheme appears inverted,

being a dark purplish-red with scattered whitish spots, instead of cream or parchment-color mottled with dark purple-red. The annulus at the throat of the corolla-tube is less prominent. And finally the arrangement of the hairs on the corolla is different. In *C. carnosa*, there are only a few scattered subulate hairs, mainly on the lobes, while in *C. keithii* there is a sprinkling of clavate or capitate hairs among the simple hairs near the base of the lobes, and a row of minute hairs slightly within the margin of the lobes, which are altogether absent from *C. carnosa*. A strong lens is required to see these marginal hairs, but once observed they furnish a ready criterion to identify the species.

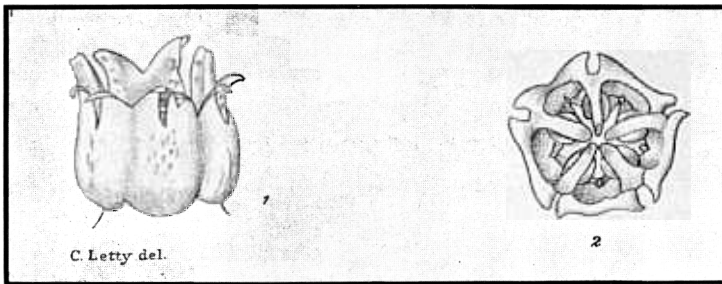


FIG. 225

Caralluma keithii R. A. Dyer

Enlargement of the corona, from a drawing by Miss Cythna Letty in the *Flowering Plants of South Africa*, 1935.

66. *Caralluma fosteri* Pillans, sp. nov.

(Description by N. S. Pillans):

Species nova affinis *C. carnosae*, sed floribus majoribus et lobis corollae ciliatis differt; ramis glabris, 15-20 cm. longis, 3-4.5 cm. crassis, tetragonis, angulis grosse dentatis; floribus fasciculatis; pedicellis 2-3 mm. longis; corolla 1.5 cm. diam., rugosa, minute papillata, atropurpurea, sulphureo-punctata; tubo campanulato; disco interrupte annulato; lobis late deltoideis, sub medio ciliatis; corona exteriore cupulare, 5-lobata, lobis subquadrangulis emarginatis; segmentis coronae interioris oblongo-lanceolatis obtusis incumbentibus.

Stems: decumbent and branching at base, erect or ascending, 15 to 20 cm. long, 4-angled, 3 to 4.5 cm. square including the teeth, glabrous, grey-green, marbled with brownish-purple; angles compressed, toothed; teeth 1 to 1.5 cm. long, much compressed laterally, deltoid, terminating in a subulate leaf-rudiment;

Flowers: in fascicles of 2 or 3 about the middle of the younger stems;

Pedicel: 2 to 3 mm. long;

Sepals: about 3 mm. long, ovate-lanceolate, glabrous;

Corolla: about 1.5 cm. in diameter, the inner surface rugose and minutely papillose, purple, mottled with cream; *tube* 4 to 5 mm. long, campanulate, 5-sided within; *disk* slightly raised around the mouth of the tube, forming an *annulus* which is interrupted by furrows radiating to the sinuses; *lobes* 3 to 5 mm. long, 6 to 7 mm. wide at base, broadly deltoid, slightly recurved at the margins, spreading, with a few setulose purple hairs on the edges of the rugosities, with purple, simple or clavate, fixed hairs on the lower half of the margins;

Outer corona: 3 mm. high, cupular at base, lobed above, purple with cream spots on the margins of the lobes; lobes 1.5 mm. long, ascending, subquadrate, deeply emarginate, with two deltoid, recurved, obtuse teeth;

Inner corona: lobes 1 mm. long, oblong-lanceolate, obtuse, purple, sparsely spotted with cream, incumbent on the anthers and not produced beyond them.

Type locality: Transvaal: Lydenburg Distr.: without precise locality.

Distribution: Not further known.

The type of *C. fosteri* is No. 21311 in the Bolus Herbarium. It is named for C. W. Foster of Krugersdorp, Transvaal, who discovered it in 1933. The flowers resemble

those of *C. carnosa*, from which they differ in the larger size of the corolla and in the ciliation of the corolla-lobes.

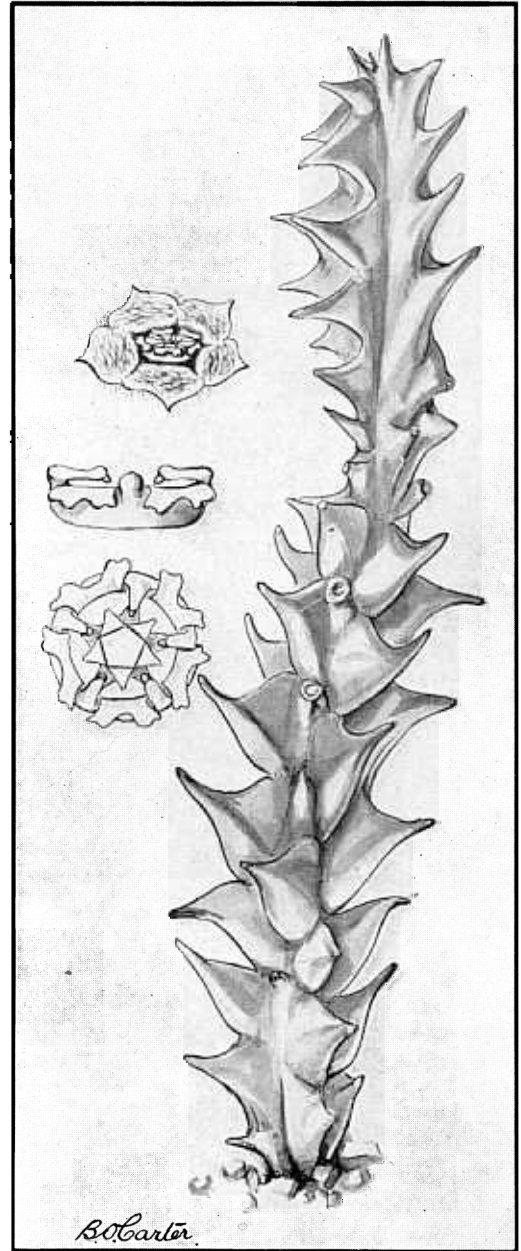


FIG. 226

Caralluma fosteri Pillans

From a drawing by B. O. Carter in the Bolus Herbarium, Kirstenbosch.

Stem x 0.85

Flower x 1.75

Corolla x 3.5

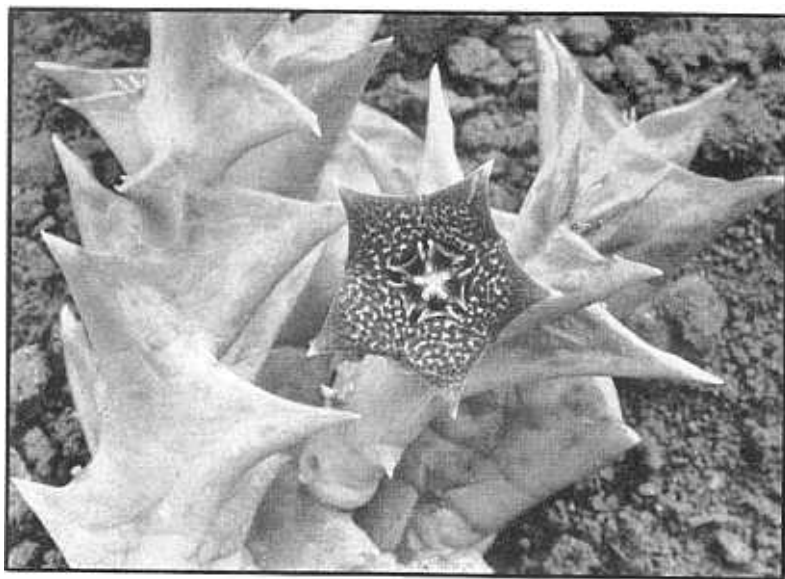


FIG. 227

Caralluma schweickerdtii Obermeijer x 2.

Photo by Herbert Lang.

67. *Caralluma schweickerdtii* Obermeijer, sp. nov.*Caralluma carnosa* Schweickerdt, Flow. Pl. So. Afr., t. 592. 1935. *Nec* Stent, 1916.

(Description by Miss A. A. Obermeijer) :

Caules carnosi, erecti vel adscendentes, 4-angulati, 17 cm. alti, 3-5 cm. in diam. (dentibus inclusis), glabri, virides, brunneo-maculati; anguli dentibus patentibus, deltoideis, compressis, 1.5 cm. longis instructi. Flores 1-3 ad apicem ramorum aggregati. Pedicelli ad 3 mm. longi. Sepala 4 mm. longa, lanceolata, acuta; sini flagellis instructi. Corolla 1 cm. longa, 1-2 cm. in diam., campanulata, extus glabra, viridis, intus purpureo-rubra, paulum cremeo-maculata, papillosa, aliquando pilis bulbosis clavatis induta; tubus annulo pentagono parvo instructus; lobi deltoidei, 5 mm. longi, 7 mm. lati, paullum patentes. Corona exterior crateriformis; lobi aliquando lyrati, patentes, ad apicem paullum concavi vel bifidi, roseo-cremei. Lobi coronae interioris antheris incumbenti, maculati, dorso carnosogibbosi.

Stems: deep green, speckled with purple dots, branched, succulent, 17 cm. high, 4 cm. in diameter including the teeth, 4-angled, glabrous; teeth 1.5 cm. long, 4 mm. broad, laterally compressed, ascending-spreading, with two minute opposite spines situated 2 to 2.5 mm. from the spiny apex;

Flowers: 1 to 3, aggregated near the apex of the stems, appearing successively;

Pedicel: up to 3 mm. long;

Sepals: 4 mm. long, lanceolate, glabrous, with a small thin flagellum at each sinus;

Corolla: campanulate, 8 mm. deep, 1.8 cm. in diameter, pale green and obscurely veined with pink on the outer surface; inner surface dark wine-red, irregularly mottled with short yellow ridges, rugulose, papillate, with a few scattered subulate and clavate hairs mainly on the lobes; throat with an inconspicuous ring; lobes 5 mm. long, 7 mm. broad at the base, broadly triangular, with a small tooth in each sinus;

Corona: 3 mm. high, 4 mm. in diameter;

Outer corona: subglobose, cup-shaped with somewhat lyre-shaped lobes; lobes parchment-colored, speckled with light purple spots, erect, bifid, with the tips slightly recurving and incumbent on the corolla-throat;

Inner corona: lobes parchment-colored, speckled with brown spots, 2 mm. long, arising from the angles between the outer corona-lobes, incumbent on the anthers, with the apices converging, subulate-acute, with a dorsal crest on their lower half.

Type locality: Transvaal: Zoutpansberg Distr.: east of the Zoutpan.

Distribution: Also from the Lydenburg Distr.: Buffelsvlei, between Fort Burger and Lydenburg.

"Schweickerdt's *Caralluma*" was discovered by three of our collaborators, Miss Obermeijer, Miss Verdoorn and Dr. Schweickerdt, on an expedition to the north side of the Zoutpansberg, in the northern Transvaal, in November, 1932. It greatly resembles *C. carnososa* and was at first referred to that species, but it differs in its larger flowers, twice the size of the tiny bells of *C. carnososa*. The wine-colored inner surface of the corolla, marked with a few irregular yellow ridges, contrasts vividly with the cream-colored ground and purple spots of *C. carnososa*. It is a sand loving plant, flowering in the November spring sunshine, while *C. carnososa* seeks the shade of clefts between rocks and flowers in early autumn, February and March.

In many respects *C. schweickerdtii* appears to be more nearly related to *C. keithii* than to *C. carnososa*. It shares the small inter-sepal flagella of *C. keithii*, which are absent in *C. carnososa*. It also has some of the very peculiar bulbous-based, clavate, unicellular hairs tipping the papillae on the inner corolla face, which are characteristic of *C. keithii*, but they are smaller and fewer in number. The margins of the corolla-lobes are not fringed with minute hairs, as in *C. keithii*, but some hairs of this type are scattered over the whole of the inner corolla face. The texture of the corolla-lobes does not differ noticeably from the fabric of the tube, whereas in *C. keithii*

the corolla-lobes are fleshy and densely papillate, while the tube is thin and minutely verrucose. Finally it should be noted that *C. schweickerdtii* differs very sharply from both *C. carnososa* and *C. keithii* in the structure of the outer corona-lobes. They are more or less lyre-shaped, the thickened outer edges diverging, terminally separated from one another by a broad flat lamella. In *C. carnososa* the outer corona-lobes are deeply bifurcated, consisting of two thickened ridges closely connected at the base without a lamella between them. In *C. keithii* the outer corona-lobes are also bifurcated and somewhat incumbent over the staminal column.

Dr. Schweickerdt, in the Flowering Plants of South Africa, has drawn attention to the presence of the small teeth at the sinuses between the corolla-lobes, which *C. schweickerdtii* exhibits in common with *C. carnososa* and *C. keithii*. These are especially prominent in the flower buds just before they open and they correspond closely to the intermediate points of the corolla in the genus *Huernia*, and suggest that the importance of the "Huernia points," as a distinguishing generic character, may have been somewhat overrated.

The type specimen of *C. schweickerdtii* is No. 19597 in the National Herbarium, Pretoria, and No. 34945 in the Transvaal Museum.

NOTE: Dr. H. G. Schweickerdt has written us that Miss Obermeijer's description of *C. schweickerdtii* is to be included in a List of plants of the North Transvaal compiled by him for the next issue of the National Herbarium publication, Bothalia, to appear during the second half of 1936. It is probable that this publication will precede that of the present book, and in that case it will constitute the formal source for the species.

68. *Caralluma pillansii* N. E. Brown, *Flora Cap.*, iv. i. 876. 1909.

(Description by Dr. Brown, l.c.):

Plant: $\frac{3}{4}$ to 1 ft. high, robust, with only 1 rooted main stem, bushily branched; *branches* $\frac{3}{4}$ to 1 in. thick exclusive of the teeth, 4-angled, glabrous, dull green mottled and spotted with purple-brown; angles with stout much compressed deltoid-conical teeth $\frac{1}{3}$ to $\frac{1}{2}$ in. long and (lengthwise of the stem) as much in breadth at the base, with short brown spine-like tips;

Flowers: several together in dense fascicles along the grooves of the stems, 2 to 3 of each fascicle open together;

*Pedice*l: $\frac{3}{4}$ to 1 lin. long, stout;

Sepals: $1\frac{1}{4}$ lin. long, $\frac{3}{4}$ lin. broad, ovate, acute or acuminate, glabrous;

Corolla: outside smooth, glabrous, whitish-green, dotted with purple-brown; inside minutely tuberculate-rugulose, pubescent with short purple hairs fixed in every posture and spotted all over with "purple-brown on a purplish-grey ground" (*Pillans*); *tube* $2\frac{1}{2}$ to 3 lin. long, campanulate; *lobes* slightly spreading, 4 to 5 lin. long, $\frac{1}{4}$ in. broad, oblong or oblong-ovate, abruptly acute, with the sides folded back;

Outer corona: lobes minute, about $\frac{1}{4}$ lin. long and $\frac{1}{2}$ lin. broad, transversely rectangular, shortly and acutely bifid or emarginate, dark purple-brown, glabrous;

Inner corona: lobes $\frac{1}{2}$ lin. long, oblong, obtuse, erect, exceeding the erect anthers but not inflexed over them, with a small tubercle at the base where united to the outer corona, dark purple-brown;

Staminal column: and entire corona very dwarf, scarcely 1 lin. high; style apex not covered by the anthers.

Type locality: Cape Prov.: Robertson Distr.: among bushes in Donker Kloof, near Montagu.

Distribution: Also from Worcester Distr.: Hex River Pass; Beaufort West or Willowmore Distr.: between Beaufort West and Willowmore.

Discovered by Mr. Pillans at the extreme west of the Little Karroo, about 100 miles from Capetown. It is a plant up to one foot high, or more, branching bushily from a single rooted stem, like *Caralluma armata*, and like that species armored with large stout teeth, with spine-like tips. The flowers form in close clusters on the sides of the stems. They are purplish-grey on the inner face, with purple-brown spots, minutely rugose and pubescent with short purple hairs.

There appears to be an error in Dr.

Brown's description, where he speaks of the inner corona-lobes as "erect, not inflexed over the anthers." Dr. S. Schönland pointed out, in an article in the Records of the Albany Museum, 1914, that he had found a specimen of the species, in whose flowers the inner corona-lobes were closely incumbent on the staminal column; and Mr. Pillans writes us that in the type also the inner corona-lobes are inflexed over the anthers. Mr. Pillans comments on the beauty of the plant stems, which he says often appear mottled with blue.

69. *Caralluma incarnata* (Linnaeus fil.) N. E. Brown, Gard. Chron., xii. 369. 1892.

Euphorbium erectum &c. Burman, Rar. Afr. Pl., 15. 1738.

Stapelia incarnata Linnaeus fil., Suppl., 171. 1781.

Podanthes incarnata Sweet, Hort. Brit., 2 Ed., 358. 1830.

Piранthus incarnatus G. Don, Gen. Hist., iv. 114. 1838.

Boucerosia incarnata N. E. Brown, Journ. Linn. Soc., xvii. 166. 1878.

(Description by Dr. Brown, Flora Cap., iv. i. 882):

Plant: bushy, 1 ft. or more high; *branches* erect, $\frac{1}{2}$ to $\frac{3}{4}$ in. thick, 4-angled, with stout conical spreading teeth $1\frac{1}{2}$ to 2 lin. long, hardened at the tips, glabrous, greyish-green (subglaucous?);

Flowers: from small flowering-cushions, arranged along the grooves between the angles, producing "usually solitary" (*Masson*), "4-nate" (*Thunberg*) flowers, probably for 2 or more years in succession;

*Pedice*l: $\frac{1}{2}$ to $\frac{3}{4}$ lin. long, glabrous;

Sepals: about $\frac{3}{4}$ lin. long, ovate-lanceolate, acuminate, glabrous;

Corolla: pale pink varying to white (*Masson*), with a few hairs around the mouth of the tube and at the very base of the lobes within, otherwise glabrous and not ciliate; *tube* about 1 lin. long, campanulate; *lobes* ascending-spreading, $1\frac{1}{2}$ to $1\frac{3}{4}$ lin. long, $\frac{1}{2}$ to $\frac{2}{3}$ lin. broad at the base, probably larger when alive, linear-lanceolate, subacute or obtuse, convex from the sides being reflexed or recurved;

Outer corona: lobes about $\frac{1}{4}$ lin. long, erect or ascending-spreading, subquadrate, bifid, with a broad notch between the teeth, not exceeding the staminal column, "yellow" (*Thunberg*);

Inner corona: lobes $\frac{1}{3}$ lin. long, linear-subulate, acute, incumbent on the backs of the anther and slightly exceeding them.

Type locality: South Africa: without precise locality.

Distribution: Cape Prov.: Ceres Distr.: Karroopoort, north of Ceres; Little Namaqualand: Richtersveld: Steinkopf; Piquetberg Distr.: near Verloren Valley; Malmesbury Distr.: mountains near Compagnies Post (East India Company's Fort?) at Saldanha Bay.

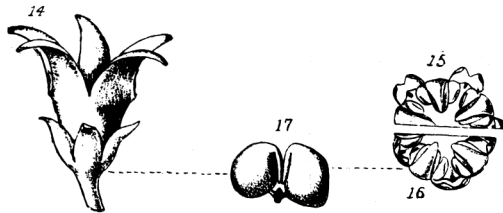


FIG. 228

Caralluma incarnata N. E. Brown

From Journal of the Linnean Society, 1878.

The "flesh-colored *Caralluma*" was one of the first *Stapeliads* to become known in Europe. It was figured in Burman's *Decades of Rare African Plants*, 1738, and was mentioned in the *Supplementum* of the younger Linnaeus, 1781 (see Appendix B). It was known to both Thunberg and Masson, and in more recent times has been collected from the Malmesbury district of the Cape Province to the Richtersveld in Little

Namaqualand.

C. incarnata is a bushy plant, a foot or more high, the stems erect, the teeth stout and spreading, with flowers a half-inch in diameter, varying in color from pale pink to white. Dr. N. E. Brown recognized a var. *alba*, of which the inner corolla surface is uniformly creamy-white. It does not appear to differ from the type materially except in the color and much longer lobes.



FIG. 229

Caralluma incarnata var. *alba* N. E. Brown x 1.

Photo by F. Wiedemann.

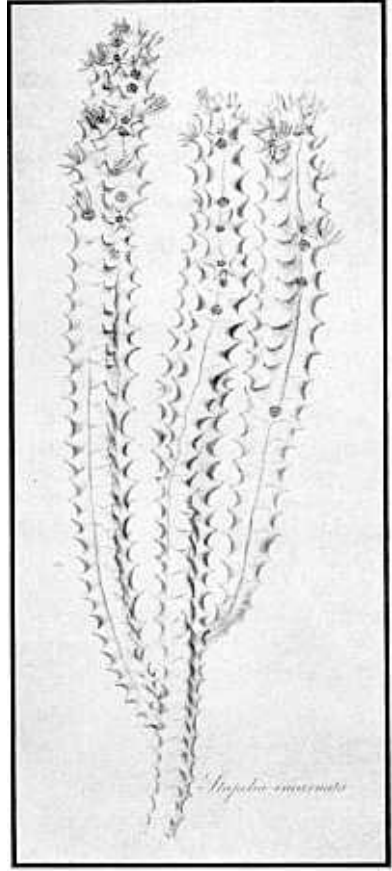


FIG. 230

Caralluma incarnata N. E. Brown
x 0.3

From Masson: *Stapeliae Novae*, 1796.

Var. a. *Caralluma incarnata* var. *alba* (G. Don) N. E. Brown, *Flora Cap.*, iv. i. 882. 1909.

Piaranthus incarnatus var. *albus* G. Don, *Gen. Hist.*, iv. 114. 1838.

(Description by Dr. Brown, l.c.):

Plant: branching near the base with *branches* 3 to 6 in. (or more?) long, $\frac{1}{2}$ to 1 in. thick, erect, dark green with a greyish powdery covering;

Flowers: 3 to 5 together, developing in succession;

Pedicel and sepals: about 1 lin. long;

Corolla: pink on the tube and lobes outside; uniformly creamy-white inside, covered on the very base of the lobes and upper part of the tube with small stiff pink hairs; *tube* $1\frac{1}{2}$ to 2 lin. long; *lobes* 3 to 5 lin. long, $\frac{3}{4}$ to 1 lin. broad at the base, linear, acute, with recurved margins;

Outer and inner corona: golden-yellow;

Otherwise exactly as in the type.

Type locality: Unknown.

Distribution: Cape Prov.: Clanwilliam Distr.: near Lambert's Bay; Malmesbury Distr.: among shrubs in sandy places near Hopefield, at 200 ft. elevation: only one plant found.

70. *Caralluma ramosa* (Masson) N. E. Brown, Icon. Pl., t. 1904. 1890.

Stapelia ramosa Masson, Stap. Nov., 21. 1796.

Piarranthus ramosus Sweet, Hort. Brit., 2 Ed., 359. 1830.

(Description by Dr. Brown, Flora Cap., iv. i. 874):

Plant: about 1 ft. high, rather densely and bushily branched, glabrous, pale greyish-green or somewhat glaucous, shaded with purple; *branches* erect, $\frac{1}{2}$ to 1 in. or more thick, 4-angled and 4-grooved; angles thick, obtusely rounded, crenate, but scarcely toothed, except at the tips of the young branches;

Flowers: in small fascicles along the grooves between the angles;

*Pedice*l: about 1 lin. (in fruit becoming 3 to 4 lin.) long, glabrous;

Sepals: 1 to $1\frac{1}{4}$ lin. long, lanceolate, acute, glabrous;

Corolla: small, glabrous outside; *tube* about $\frac{1}{8}$ in. long, campanulate, minutely pubescent around the mouth and apparently whitish within; *lobes* $2\frac{1}{2}$ to 3 lin. long, lanceolate, acute, replicate, with a rather acute ridge down the face, glabrous and blackish-purple on the inner face, not ciliate;

Outer corona: lobes minute, less than $\frac{1}{4}$ lin. long, broader than long, bifid, pouch-like at the base;

Inner corona: lobes nearly $\frac{1}{2}$ lin. long, linear or linear-subulate, closely incumbent upon the backs of the anthers and slightly exceeding them, with a slight dorsal transverse ridge at their base;

Follicles: erect, subparallel or very slightly diverging, 2 to $2\frac{3}{4}$ in. long, $\frac{1}{3}$ in. thick, terete-fusiform, tapering to an acute point, glabrous, pale green; *seeds* $2\frac{1}{2}$ lin. long, 1 lin. broad, irregularly and narrowly ovate-oblong, deeply concave from the very thick margins being incurved on one side, very convex on the other, not rugose, brown.

Type locality: Cape Prov.: Riversdale or Ladismith Distr.: Karroo, beyond Platte Kloof, "around the hot springs."

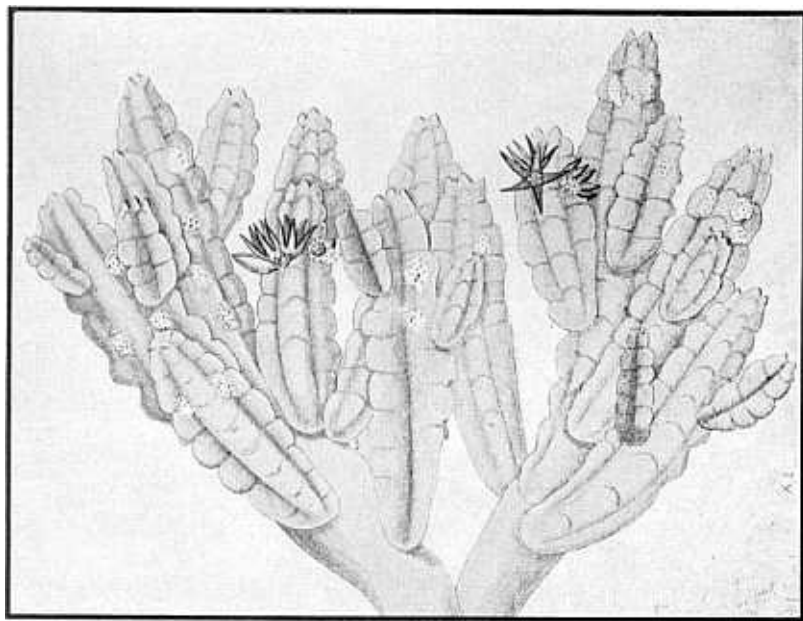


FIG. 231

Caralluma ramosa N. E. Brown x 0.5

From Masson: *Stapeliae Novae*, 1796.

Distribution: Collected at many points in Swellendam; Riversdale; Laingsburg; Ladismith; and Prince Albert districts.

The "branching *Caralluma*" is a plant with an extraordinarily dense bushy growth, branching irregularly, the stems 6 to 15 inches high, heavily rounded and scarcely toothed except at the tips of the young growth. The half-inch flowers form in small clusters, very dark purple or almost black on the inner face of the corolla-lobes

and whitish in the small campanulate central tube. It was first collected by Francis Masson and flowered in his "little garden at the Cape of Good Hope in August, 1792." It is quite common in the southerly Karroo, growing on the shales among other succulents from 1000 to 1400 feet elevation.



FIG. 232
Caralluma ramosa N. E. Brown x 1
Photo by Herbert Lang.

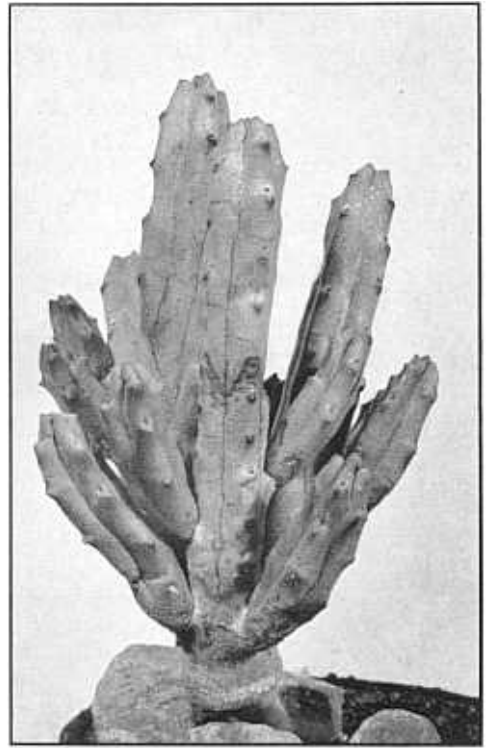


FIG. 233
Stems of *Caralluma ramosa* N. E. Brown,
grafted



FIG. 234

Caralluma villetii Luckhoff x 2.

Photo by Carl Luckhoff, in South African Gardening and Country Life, 1935.

71. *Caralluma villetii* Luckhoff, So. Afr. Gard., 95. 1935.

(Description based on that by C. Luckhoff, l.c.):

Stems: erect, up to 25 cm. long, 1.2 cm. thick excluding the teeth, branching near the base, 4-angled; angles acute, raised into laterally compressed acute teeth 3 to 5 mm. long, glabrous, greyish-green, tinged with brown;

Flower: solitary, arising at the middle or apex of the stems;

Pedicel: 5 mm. long;

Sepals: 3 mm. long;

Corolla: 2.1 cm. in diameter, with a small central *tube* about 1.5 mm. deep; outer surface light green, with a prominent purple stripe running down the length of each lobe; inner surface of tube and of the apical half of the lobes light yellow, basal half of lobes a deep wine red; *lobes* 7 mm. long, less than 5 mm. broad at the base, not acutely spreading, lanceolate, with the edges recurved, ciliate along their whole length with flattened purple hairs;

Outer corona: lobes variable, dark purple-brown;

Inner corona: lobes incumbent on and shortly exceeding the anthers, with a simple dorsal expansion, which is not serrated, dark purple-brown; dorsally connected with the outer corona-lobes.

Type locality: Cape Prov.: Van Rhynsdorp Distr.: without precise locality.

Distribution: Not further known.

"Villet's *Caralluma*" is named for Dr. C. the species in 1934 in the Van Rhynsdorp district.
T. Villet, who with Mrs. Villet discovered

The flowers are drooping in habit and in this respect reminiscent of *Caralluma dependens*. Their closest affinity, however, is to *C. cincta*, from which they are principally differentiated by the complete change in the color scheme and the narrower corolla-lobes. The species is also related to *C. inversa*, differing by the drooping tendency of the flowers, the larger corolla, the different color pattern and the absence

of spots within the tube. Mr. Luckhoff comments on it as follows: "It is one of the most beautiful of the small-flowered *Carallumas*, and equal in this respect to *C. cincta*. The cilia are of the same type as those of its nearest congeners, *C. dependens*, *C. inversa* and *C. cincta*, flattened as if squashed and very ragged and straggling ("jointed"), never hanging evenly and parallel, as for instance in *Stapelia revoluta*."



FIG. 235
Caralluma villetii Luckhoff x 2.
Photo by Carl Luckhoff.

72. *Caralluma parviflora* (Masson) N. E. Brown, Gard. Chron., xii. 370. 1892.*Stapelia parviflora* Masson, Stap. Nov., 22. 1796.*Piaranthus parviflorus* Sweet, Hort. Brit., 1 Ed., 278. 1827.

(Description by Dr. Brown, Flora Cap., iv. i. 878):

Plant: 6 to 8 in. high, with several erect stems from the base, which bear a few very spreading branches; *stems* and branches 4-angled, 5 to 7 lin. square, with conical acute spreading or slightly recurved teeth $1\frac{1}{2}$ to 2 lin. long at the angles, glabrous, dull green or purplish;

Flowers: 1 to 3 (annually?), produced from flowering cushions arranged along the grooves between the angles on the upper part of the stems;

*Pedice*l: 3 to 5 lin. long, curved downwards;

Sepals: about $\frac{3}{4}$ lin. long, ovate or ovate-lanceolate, acute;

Corolla: drooping, about $\frac{1}{3}$ in. in diameter; *tube* or united part scarcely 1 lin. long, apparently saucer-shaped; *lobes* somewhat spreading, $\frac{1}{8}$ in. long, $\frac{3}{4}$ lin. broad, lanceolate, acute, flat, rugose, ciliate on the margins, yellowish-green spotted with purple-brown.

Type locality: Cape Prov.: Little Namaqualand: without precise locality.

Distribution: Not further known.

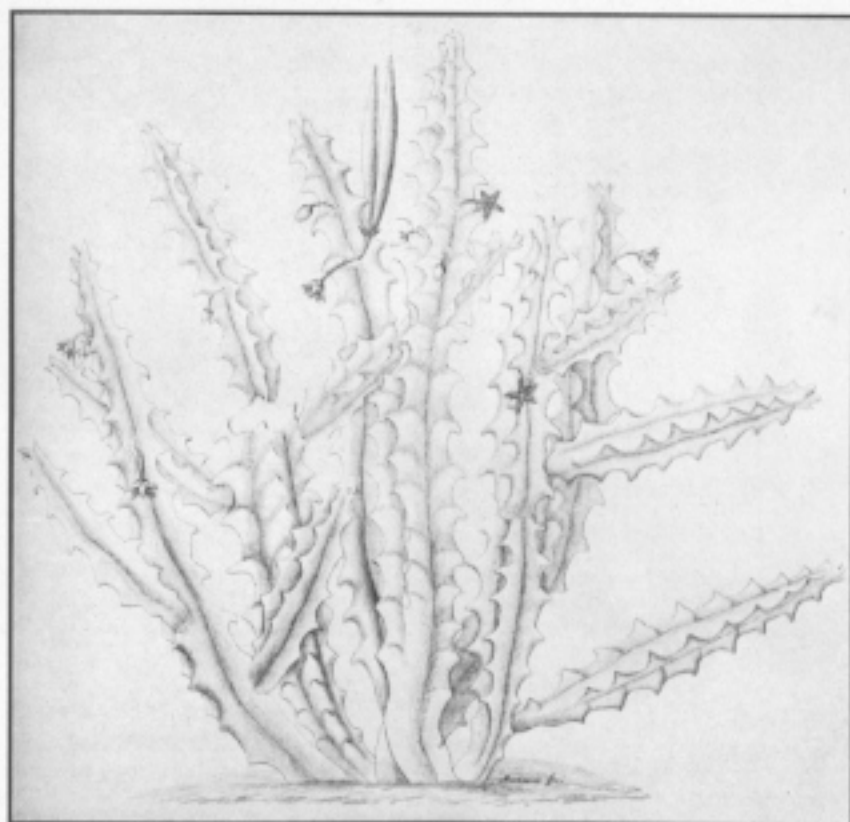


FIG. 236

Caralluma parviflora N. E. Brown x 0.5From Masson: *Stapeliae Novae*, 1796.

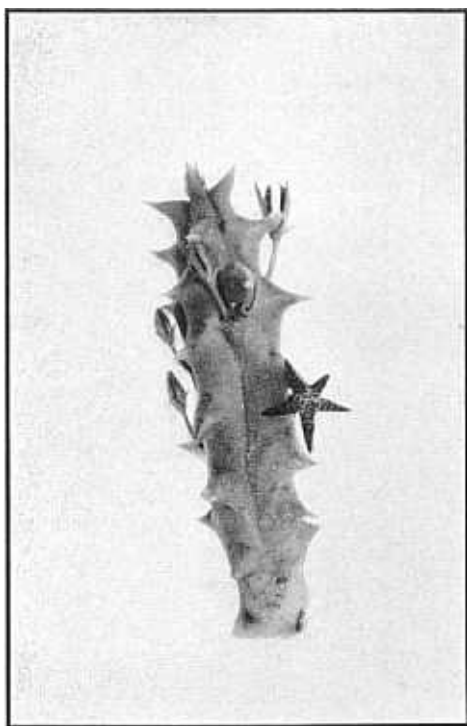
The "small-flowered *Caralluma*" is one of the half-dozen species of Francis Masson, which have remained undiscovered since his day. He wrote that it grew under shrubs in Little Namaqualand. It is imperfectly known, as he gave no information as to the corona form. The figure in Masson's book, however, shows that it is a characteristic *Caralluma*, built of several strongly toothed stems with smaller branches. The very small flowers appear on the upper third of the stems. The corolla has a very small tube and rugose, spreading

lobes, yellowish-green spotted with purple-brown. The lobes are ciliate, but the whole flower appears to be otherwise glabrous. The drooping habit of the flowers suggests *Caralluma dependens*, but the two plants can be differentiated very easily, as the pedicels in *C. parviflora* are two or three times as long as those of *C. dependens*, and the purple-brown spots in *C. parviflora* extend to the tips of the lobes, while *C. dependens* has purple-brown lines extending half-way up the lobes only, the tips being uniformly dark purple-brown.

FIG. 237

Caralluma sp. unidentified

Photo by S. Tapscott. The comparatively long pedicels suggest that this plant may be more closely related to *C. parviflora* than to *C. dependens*; but the flowers do not have the drooping habit of either of these, and they may constitute a distinct species.



73. *Caralluma inversa* N. E. Brown, Gard. Chron., xxxiii. 354. 1903.

(Description by Dr. Brown, Flora Cap., iv. i. 879):

Plant: erect, branching, similar to *Caralluma dependens*; branches 4-angled, with conical spreading teeth;

Flowers: from flower cushions arranged along the grooves between the angles;

*Pedice*l: 1 to 2 lin. long, glabrous;

Sepals: $\frac{2}{3}$ to 1 lin. long, lanceolate or deltoid-ovate, acute, glabrous;

Corolla: tube about $1\frac{1}{4}$ lin. long, campanulate or funnel-shaped, glabrous, white at the base, spotted with purple-brown above and entirely purple-brown at the mouth within; lobes about $2\frac{1}{2}$ lin. long, 1 to $1\frac{1}{4}$ lin. broad, oblong or linear-oblong, shortly acute, dark purple-brown on the basal half, rather deep grass-green on the apical half, not spotted, glabrous on both sides, ciliate from base to apex with long jointed purple hairs;

Outer corona: lobes $\frac{1}{2}$ to $\frac{2}{3}$ lin. long, slender, linear-filiform, entire, obtuse, glabrous, purple-brown;

Inner corona: lobes $\frac{1}{3}$ to $\frac{1}{2}$ lin. long, ovate or ovate-oblong, obtuse, incumbent on the backs of the anthers and equaling or very slightly exceeding them, with a subquadrate or oblong projection about $\frac{1}{4}$ lin. long on the back at the base, which is obtuse, emarginate or minutely 3-toothed at its apex, purple-brown.

Type locality: Cape Prov.: Clanwilliam Distr.: without precise locality.

Distribution: Not further known.

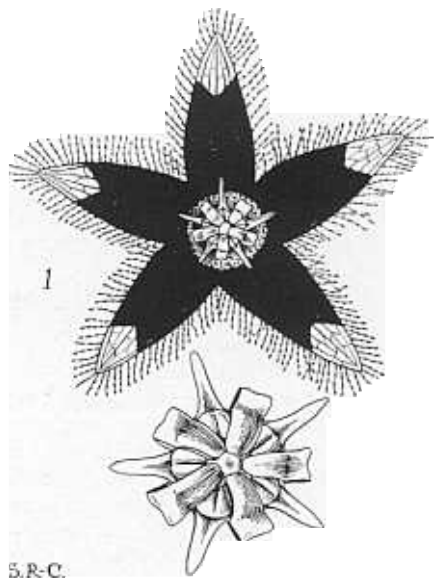
Discovered prior to 1903 in the Clanwilliam district by C. Ayres. It resembles *Caralluma dependens* in its erect branching stems with stout conical teeth; but has exactly "inverse" coloring in its flowers, the

corolla-lobes being dark purple-brown on the basal half and deep grass-green on the upper half. The flowers are ciliate with long jointed purple hairs, but otherwise glabrous inside and out.

FIG. 238
Caralluma inversa N. E. Brown

1. Corolla x 4.
2. Corona x 10.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.



S.R.C.

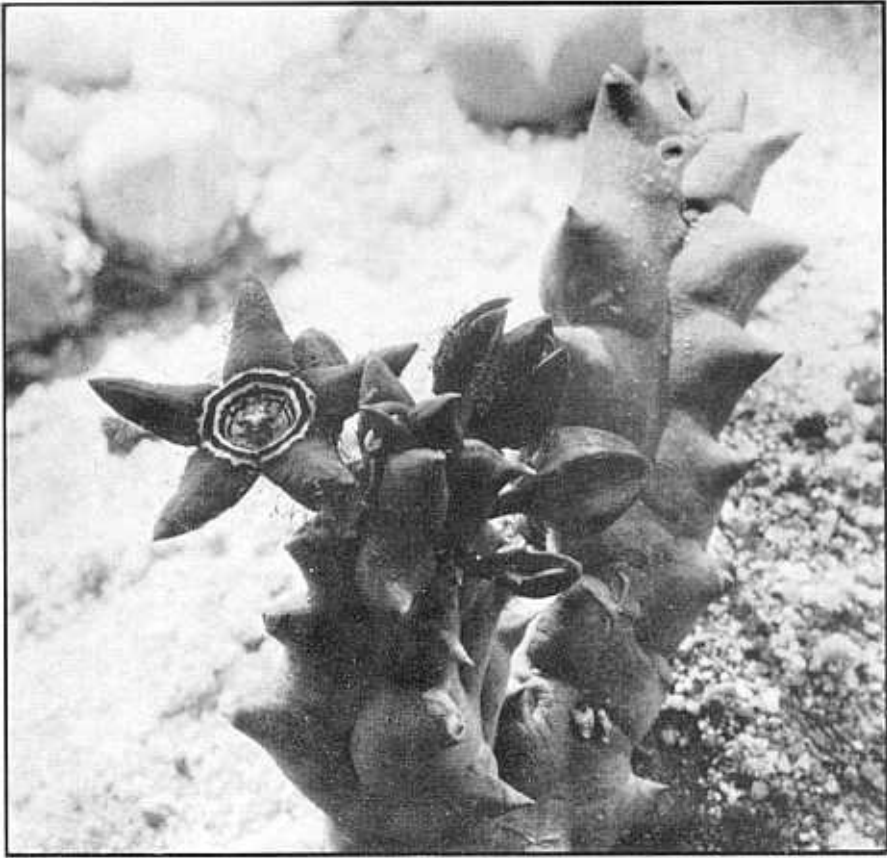


FIG. 239

Caralluma cincta Luckhoff x 2.

Photo by Carl Luckhoff.

74. *Caralluma cincta* Luckhoff, So. Afr. Gard., 56. 1935.

(Description by C. Luckhoff, l.c.):

Stems: erect, 5 cm. long, 1.2 cm. thick excluding the teeth, branching about the middle, 4-angled; angles acute, raised into laterally compressed acute teeth 3 to 5 mm. long, glabrous, green tinged with brown;

Flower: solitary, arising about the middle of the stems;

Pedicel: 5 mm. long;

Sepals: 3 mm. long;

Corolla: 2.1 cm. in diameter, with a small central *tube* about 1.5 mm. deep; outer surface light green, with a prominent purple stripe running down the length of each lobe; inner surface a deep purple-black, with several conspicuous concentric pale yellow lines on the united portion and in the tube; *lobes* spreading, 8 mm. long, 5 mm. broad at the base, lanceolate, with the edges recurved, ciliate except at the base and apex with flattened purple hairs;

Outer corona: lobes 2 mm. long, 0.25 mm. broad, connate at the base, linear, suddenly widened at the apex and there 0.5 mm. broad, ascending-spreading, channeled down the inner face, blackish on the apical half, otherwise yellow;

Inner corona: lobes 1 mm. long, acute, incumbent on and shorter than the anthers, with a serrated vertical dorsal expansion, blackish except at the extreme base; dorsally connected with the outer corona-lobes.

Type locality: Cape Prov.: Van Rhynsdorp Distr.: near the Zout River Bridge.

Distribution: Not further known.

The "girdled *Caralluma*" is one of the rarest Stapeliads, having been collected in a single stem by Richard Primos in the Van Rhynsdorp district, at the northern border of the Knersvlakte in 1932. The vivid circles of pale yellow on the corolla disk stand out against the deep purple-black of

the lobes like a brilliant girdle, giving a very dramatic tone to the flowers. The corona too is striking, the outer corona-lobes laterally broadened to a T-like apex and the inner corona-lobes with a saw-edged wing-like expansion at the back.

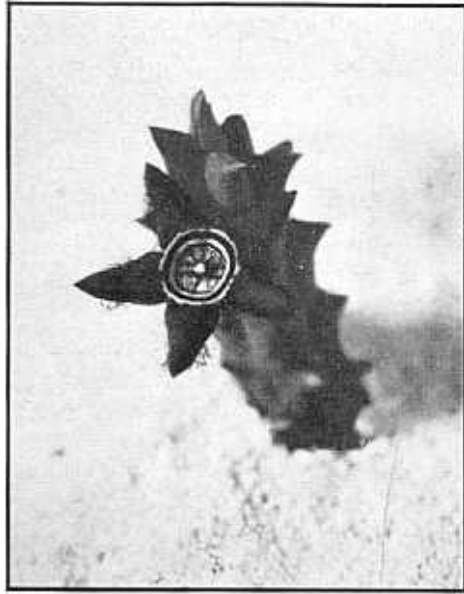


FIG. 240

Caralluma cincta Luckhoff x 1.4

Photo by Carl Luckhoff.

75. *Caralluma linearis* N. E. Brown, Icon. Pl., t. 1903. 1890.

(Description by Dr. Brown, Flora Cap., iv. i. 883):

Stems: obtusely 4-angled, with small teeth $\frac{1}{2}$ to $\frac{3}{4}$ lin. long, hardened at the point, glabrous, flowering along the grooves between the angles;*Flowers*: probably fasciculate;*Pedice*l: $\frac{1}{2}$ to 1 lin. long, becoming about $1\frac{1}{2}$ lin. long in fruit, glabrous;*Sepals*: about $\frac{3}{4}$ lin. long, ovate, acute, glabrous;*Corolla*: tube about $1\frac{1}{2}$ lin. long, campanulate, glabrous outside and within, apparently whitish; lobes ascending-spreading, $\frac{1}{4}$ in. (in dried flowers) long, $\frac{3}{4}$ lin. broad, linear, acute, replicate (longitudinally folded), apparently somewhat incurved at the apex, glabrous and apparently not ciliate, dark purple-brown;*Outer corona*: lobes ascending, about $\frac{2}{5}$ lin. long and broad, subquadrate, bifid to half-way down, with or without a minute tooth in the notch and the teeth deltoid, obtuse, glabrous, apparently white or yellowish;*Inner corona*: lobes $\frac{3}{4}$ lin. long, flat, linear, obtuse, incumbent on the backs of the anthers and connivent at the base, then erect with very revolute tips, purple or purple-brown;*Follicles*: about $1\frac{1}{2}$ in. long, narrowly fusiform, smooth, glabrous; *seeds* (perhaps immature) $1\frac{1}{2}$ lin. long, $\frac{1}{2}$ to $\frac{2}{3}$ lin. broad, oblong, with very thick margins incurved on one side and a prominent central ridge on the other, glabrous, smooth, brown, tipped with a tuft of hairs scarcely $\frac{1}{2}$ in. long.

Type locality: Cape Prov.: Prince Albert Distr.: Seven Weeks Poort.

Distribution: Not further known.

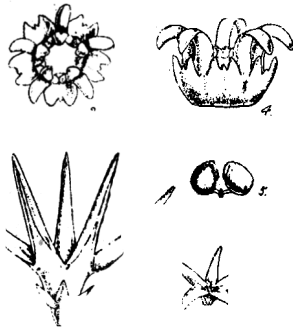


FIG. 241

Caralluma linearis N. E. Brown

From Hooker's Icones Plantarum, 1890

The "linear *Caralluma*," collected by Thomas C. Bain at the extreme west of the Great Karroo about 1875 and not seen since, is an imperfectly known species. The flowers are a half inch or more in size, campanulate with the central tube whitish and the corolla-lobes dark purple-brown, glabrous throughout, with very narrow longitudinally folded linear corolla-lobes, from which the specific name is derived. The outer corona is bowl-shaped at the base, the rim with five 2-toothed lobes, the pairs of teeth often with a tiny toothed notch between them. The inner corona-lobes are quite distinctive, with very revolute tips which arch outward over the gaps between the lobes of the outer corona.

Caralluma hottentotorum

76. *Caralluma hottentotorum* (N. E. Brown) N. E. Brown, Icon. Pl., sub t. 1903. 1890.

Quaqua hottentotorum N. E. Brown, Gard. Chron., xii. 8. 1879.

(Description by Dr. Brown, Flora Cap., iv. i. 880):

Plant: 4 to 6 in. high, branching at the base; *branches* obtusely 4 (rarely 5)-angled, $\frac{1}{2}$ to 1 in. square exclusive of the teeth, glabrous, greyish-green or purplish-tinted; *teeth* 2 to 3 lin. long, stout, conical, with hard spine-like tips, horizontal or slightly recurved;

Flowers: in small clusters of 6 to 10 along the grooves of the stems, opening 1 to 2 at a time;

*Pedice*l: less than 1 lin. long, becoming 4 to 6 lin. long in fruit, glabrous;

Sepals: about $\frac{3}{4}$ lin. long, deltoid-ovate, acute, glabrous;

Corolla: about $\frac{1}{4}$ in. in diameter, glabrous with the exception of a few minute hairs at the mouth and throat of the tube, pale greenish-yellow; *tube* 1 lin. long, campanulate; *lobes* about $1\frac{1}{4}$ lin. long, ovate, acute, very spreading, faintly keeled on the inner face;

Outer corona: lobes very minute, pouch-like at the base, subquadrate, bifid, yellow;

Inner corona: lobes fleshy, roundish-ovate or subhemispheric, very obtuse and very convex on the back, becoming thin and nearly flat when dried, closely applied to the backs of the anthers and about half as long as them, yellow;

Follicles: erect, subparallel, $2\frac{1}{2}$ to 3 in. long, about $2\frac{1}{2}$ lin. thick, narrowly fusiform, tapering at both ends, acute, greyish-green, streaked with purple-brown; *seeds* rather small, ovate, with a thickened margin.

Type locality: Cape Prov.: Little Namaqualand: O'okiep.

Distribution: Also from Klipfontein.

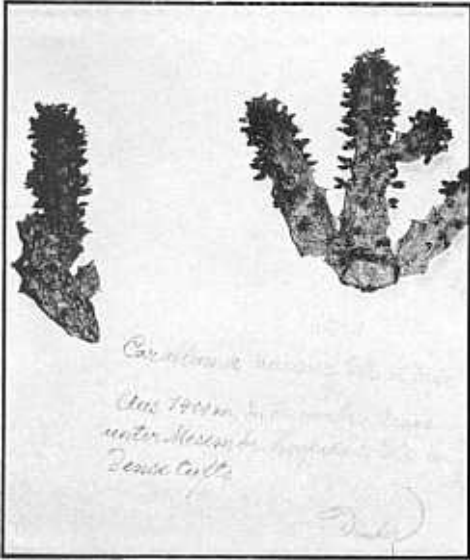


FIG. 242

Caralluma hottentotorum N. E. Brown x 0.25
Specimens from Aus, S. W. Afr., in Dinter Herbarium.

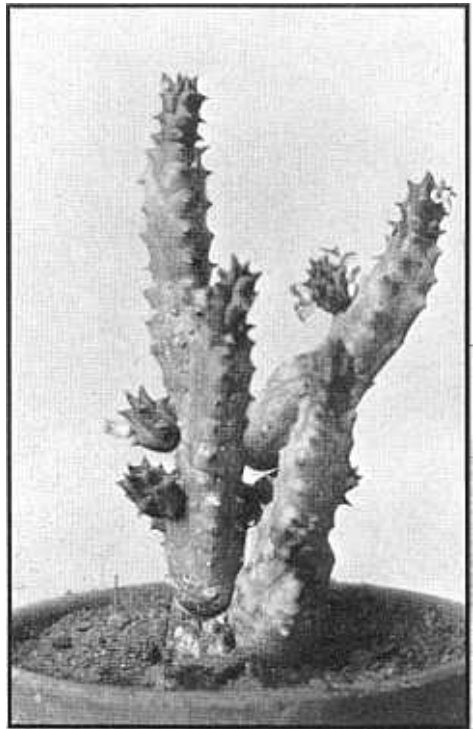


FIG. 243

Caralluma hottentotorum N. E. Brown x 0.5
From W. I. Beecroft Gardens. Photo by Havens.

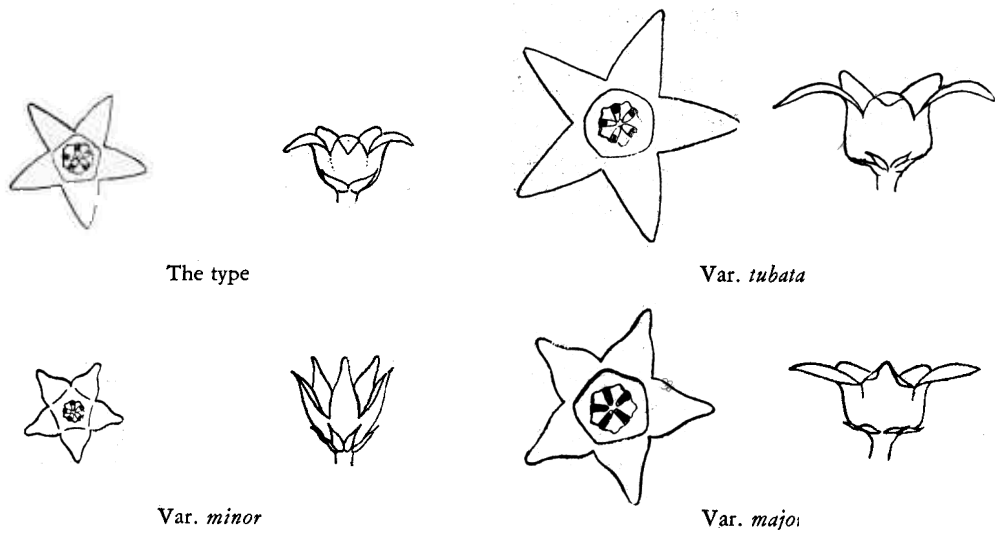


FIG. 244
Caralluma hottentotorum N. E. Brown x 2.5
Comparison of the type with the varieties
Drawing by Carl Luckhoff.

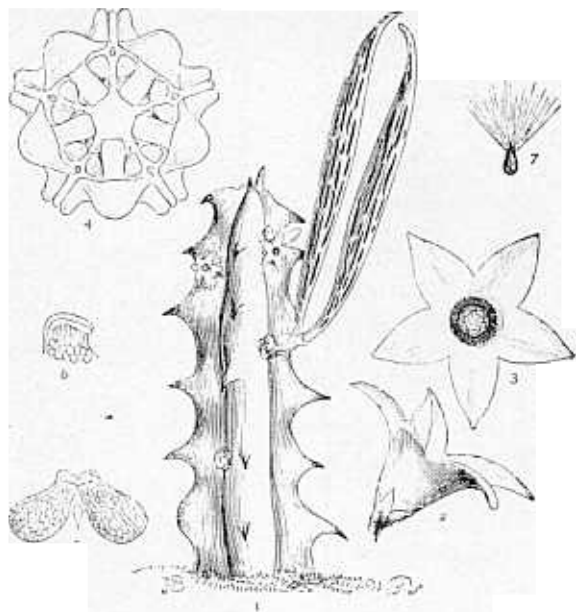


FIG. 245
Caralluma hottentotorum N. E. Brown
(1) x 1.
From *Gardeners' Chronicle*. 1879.



FIG. 246

Caralluma hottentotorum var. *major* N. E. Brown x 2.

Photo by Dr. J. Luckhoff.

Var. a. *Caralluma hottentotorum* var. *major* N. E. Brown, Flora Cap., iv. i. 881. 1909.

Caralluma ausana Dinter et Berger, Fedde: Repertorium, xv. 354. 1918.

(Description modified from that by Dr. Brown, l.c.):

Corolla: about 5 lin. in diameter, straw color (*Pillans*); *tube* $1\frac{1}{4}$ lin. long, with a few white hairs seated on minute papillae at the mouth of the tube; *lobes* spreading, 2 lin. long, 1 lin. broad at the base, thence gradually tapering to an acute apex;

Outer corona: $2\frac{1}{4}$ mm. in diameter, lobes pouch-like or reduced to 5 pairs of minute teeth;

Inner corona: lobes stout, linear-oblong, very convex on the back, nearly or quite as long as the anthers and closely incumbent on their backs;

Otherwise as in the type.

Type locality: Cape Prov.: Little Namaqualand: Meskraal, near Komaggas.

Distribution: Also in Little Namaqualand: Oubiep; and near Spektakel; South West Africa: near Aus.

Discovered about 1900 by Robert Rich, Government sheep inspector.

Var. b. *Caralluma hottentotorum* var. *minor* Luckhoff, var. nov.

(Description by C. Luckhoff) :

Corolla: 5 mm. in diameter, primrose-yellow; *tube* $2\frac{1}{2}$ mm. in diameter, $1\frac{1}{4}$ mm. deep, with a few white hairs seated on minute papillae at the mouth; *lobes* usually erect or erect-spreading, 3 mm. long, $1\frac{1}{2}$ mm. broad at the base, gradually tapering to an acute apex;

Outer corona: $1\frac{1}{4}$ mm. in diameter, lobes minute, pouch-like;

Inner corona: lobes stout, convex on the back, closely incumbent on the backs of the anthers and about half as long as them;

Otherwise as in the type.

Type locality: Cape Prov.: Little Namaqualand: hills around Springbok.

Distribution: Not otherwise known.



FIG. 247

Caralluma hottentotorum var. *major* N. E. Brown x 1.5

Var. c. *Caralluma hottentotorum* var. *tubata* Luckhoff, var. nov.

(Description by C. Luckhoff) :

Corolla: $1\frac{1}{4}$ cm. in diameter, straw-yellow; *tube* 4 mm. in diameter, 2 to $2\frac{1}{2}$ mm. deep, dilated at the base, with minute papillae, but no hairs at the mouth; *lobes* spreading, $4\frac{1}{2}$ mm. long, 3 mm. broad at the base, acute;

Outer corona: $2\frac{1}{2}$ mm. in diameter, lobes small, pouch-like;

Inner corona: lobes stout, convex on the back, closely incumbent on the backs of the anthers and half as long as them;

Otherwise as in the type.

Type locality: Cape Prov.: Little Namaqualand: Richtersveld.

Distribution: Not otherwise known.

The "Hottentots' Caralluma" is one of Sir Henry Barkly's plants, from Little Namaqualand, around O'okiep and thence south-west to the Komaggas Mountains. According to Mr. Pillans the Hottentots

call the plant "bitter gwagwa." Their interest in it, which is commemorated in the specific name, is due to what they believe to be its medicinal virtue; but they consider it poisonous and do not eat it. The flowers are only a quarter of an inch wide, light yellow and glabrous except for a few minute hairs at the mouth of the tube. The

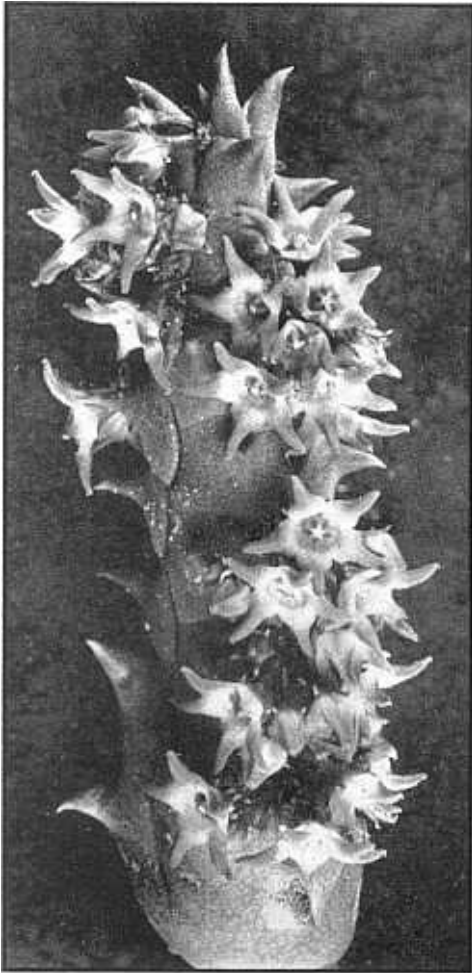


FIG. 248

Caralluma hottentotorum var. *minor*
Luckhoff x 2.5

Photo by Carl Luckhoff. Stem from Springbok,
Little Namaqualand.

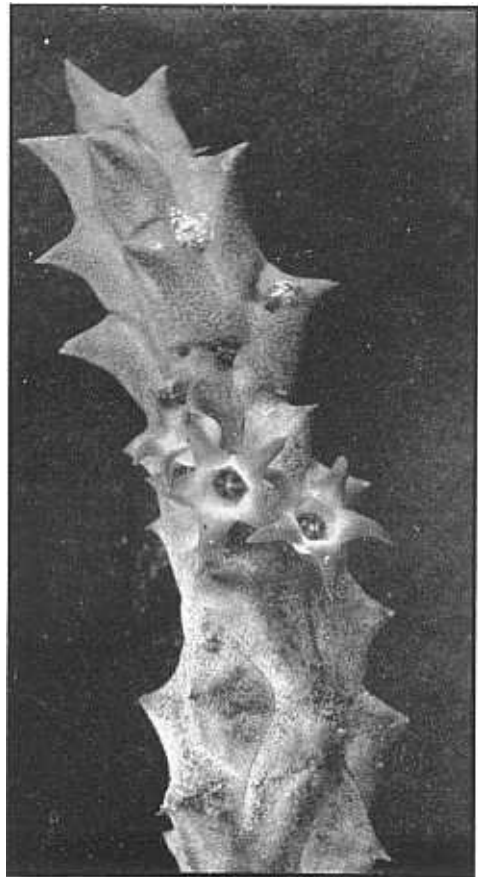


FIG. 249

Caralluma hottentotorum var. *major*
N. E. Brown x 1.8

Photo by Carl Luckhoff of a stem from Aus, S. W. Afr.

species is a classic, because of the remarkable outer corona, which is variable and at best very minute, the tiny yellow lobes pouch-like and bifid. When Dr. Brown first studied the species, he proposed a new genus, *Quaqua*, to provide for this unique case of an outer corona which at times appeared actually to vanish; but later he transferred it to the *Carallumas*, as explained in Appendix E. Mr. Luckhoff refers to the var. *major* the small yellow-flowered *Caralluma* from the region of South West Africa between Aus and Kubub, inland on the railway from Lüderitz Bay, which Prof. Dinter collected there and called *C. ausana*. "I have been able," writes Mr. Luckhoff, "to study flowering plants of *C. hottentotorum* and the var. *major* from the neighborhood of Spektakel in Little Namaqualand, between O'okiep and Komaggas, side by side with (1) plants of "*C. ausana*" from Aus in South West Africa, (2) plants of var. *minor*, apparently localized in the hills around Spring-

bok, Little Namaqualand, and (3) plants of the var. *tubata*, collected by P. van Heerden in the Richtersveld. All these are similar in their habit and stems. The size of the corolla and tube varies from the small var. *minor* to the large var. *tubata*, which is named for its very prominent corolla-tube. The size of the corona also varies, being extremely small in the var. *minor* and largest in the vars. *major* and *tubata*. The color of the corolla is straw-yellow, except in the var. *minor*, which is bright primrose-yellow." *C. hottentotorum*, with the exception of the var. *tubata*, is one of the most profusely flowering of all Stapeliads. The var. *tubata*, on the contrary, has only a few buds distributed along the grooves of the stems and rarely more than one flower is open at a time. There appears to be some difference in the extent to which the flowers open in different plants, some flaring out almost horizontally from the tube, others having the corolla-lobes open only so far as to continue the slight curve of the tube.

77. *Caralluma acutiloba* N. E. Brown, *Flora Cap.*, iv, i. 877. 1909.

(Description by Dr. Brown, l.c.):

Plant: 6 to 8 in. high, bushily branched; *branches* $\frac{1}{2}$ to $\frac{2}{3}$ in. thick, 4-angled, with stout conical acute teeth 2 to $2\frac{1}{2}$ lin. long, hardened at the apex, glabrous;

Flowers: 1 to 2 (or more?) produced from small flowering cushions, arranged along the grooves between the angles;

*Pedice*l: about $\frac{3}{4}$ lin. long, glabrous;

Sepals: 1 to $1\frac{1}{4}$ lin. long, glabrous;

Corolla: small, entirely glabrous and not ciliate, light green (or greenish-yellow?), spotted with dark purple-brown, more thickly at the tips of the lobes; *tube* 1 to $1\frac{1}{4}$ lin. long, apparently broadly and shallowly cup-shaped; *lobes* 2 to $2\frac{1}{4}$ lin. long, $1\frac{1}{2}$ lin. broad at the base, deltoid-ovate, very acute or somewhat acuminate, probably spreading;

Outer corona: about equaling the staminal column, shortly cup-shaped, with 10 equidistant deltoid acute teeth $\frac{1}{4}$ lin. long, glabrous, dark purple-brown;

Inner corona: lobes about $\frac{1}{2}$ lin. long, linear or linear-subulate, acute, incumbent on the backs of the anthers and not produced beyond them, dorsally connected to the outer corona at the base, margined with (or entirely?) purple-brown.

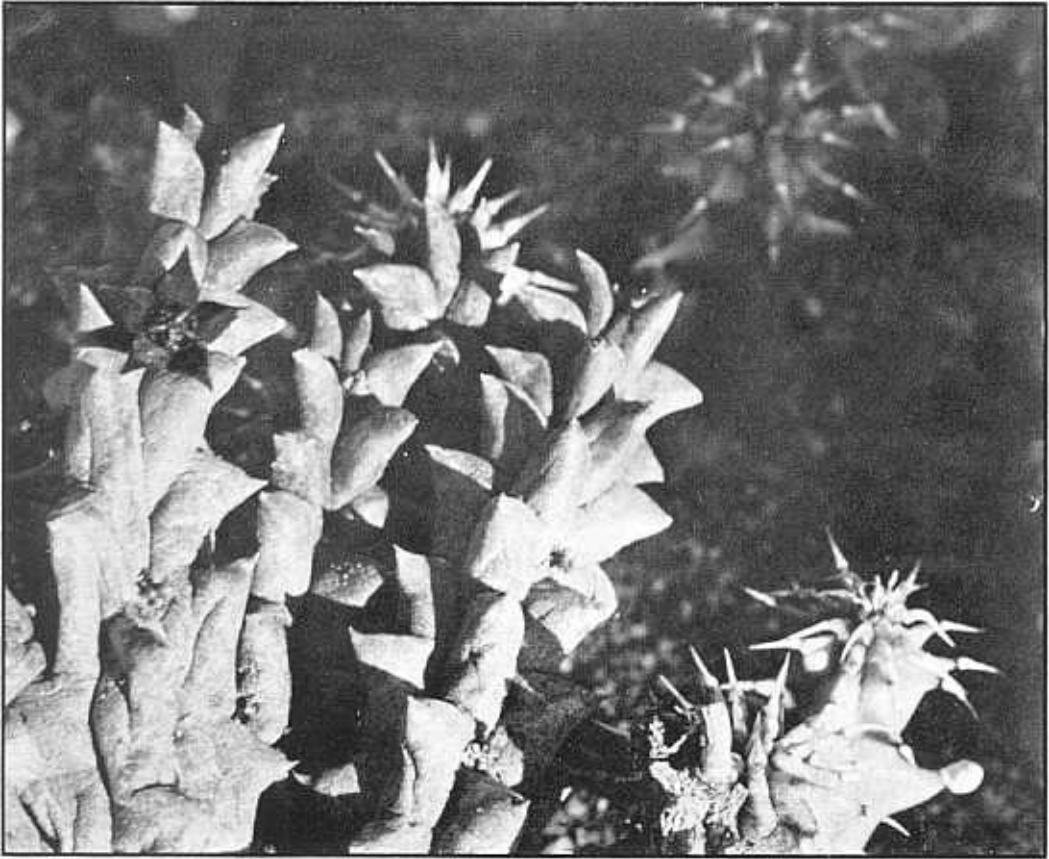


FIG. 250

Caralluma acutiloba N. E. Brown x 2.

Photo by Carl Luckhoff.

Type locality: Cape Prov.: Little Namaqualand: without precise locality.

Distribution: Not further known.

Caralluma acutiloba was discovered in Little Namaqualand, prior to 1909, by R. Templeman. It receives its name from the very acute corolla-lobes of its flowers. These are under a half-inch in diameter, light green with dark purple-brown spots, wholly glabrous and not ciliate. The stems are typically those of a *Caralluma*, bushily branched, with stout conical acute teeth, hardened at the tips.

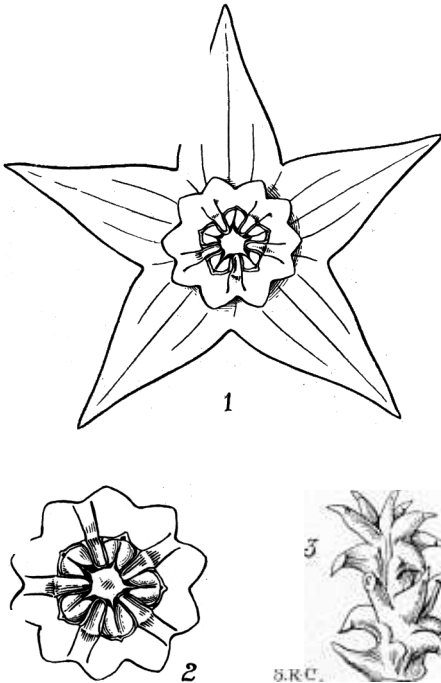


FIG. 251

Caralluma acutiloba N. E. Brown

1. Corolla x 4.
2. Corona x 6.
3. Stem x 1.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

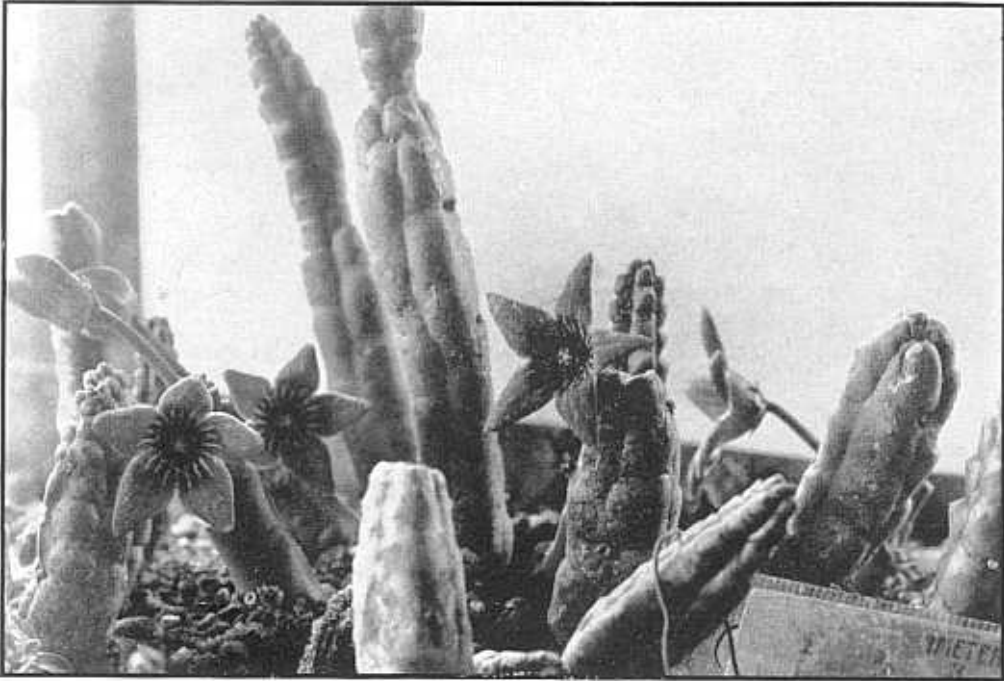


FIG. 252

Caralluma umdausensis Nel x 1.3

Photo by H. Herre in Kakteen Jahrbuch, 1936.

78. *Caralluma umdausensis* Nel, Kakteen-Jahrb., 22. 1936.

(Description based on that by Dr. G. C. Nel, l.c., translated from the Latin and German):

Stems: tufted, erect, glabrous, up to 9 cm. high, about 1 cm. thick, 4-angled; angles separated by slight furrows, verrucose towards the apex;*Flowers:* solitary, arising towards the apex of the stems;*Pedicel:* terete, glabrous, 2.8 cm. long, greenish-red;*Sepals:* deltoid, acute, glabrous, greenish-red with white dots;*Corolla:* 2.2 cm. in diameter, lobed to $\frac{3}{4}$ of the way down, with a central tube; outer surface yellowish-green with a purple margin to the lobes and the middle nerve purple-red; *tube* 5 mm. deep, inside densely papillate at the base with many short purple and white papillae, light reddish-purple with an almost regular ring of white at the base around the corona, from which radiate 20 stripes, white in color shading gradually into greenish-yellow, three of these stripes or rays extending $\frac{1}{3}$ of the way up each corolla-lobe (the middle one somewhat shorter than the two outer ones) and another one abutting at each sinus between the lobes; *lobes* 1.1 cm. long, 5 mm. broad, ovate-lanceolate, acute, irregularly spotted on the upper $\frac{2}{3}$ with greenish-yellow, glabrous, rugose on the apical $\frac{1}{3}$ only;*Outer corona:* deep blackish-purple, consisting of 5 small teeth;*Inner corona:* lobes deep blackish-purple, lanceolate, obtuse at the apex, incumbent on the anthers and not longer than them.*Type locality:* Cape Prov.: Little Namaqualand: Richtersveld: Steinkopf-Umdaus.*Distribution:* Not further known.

6



FIG. 253

Caralluma umdausensis Nel x 2.5

Photo by Herbert Lang of a plant collected by J. K. Joubert, north of Springbok,
Little Namaqualand.

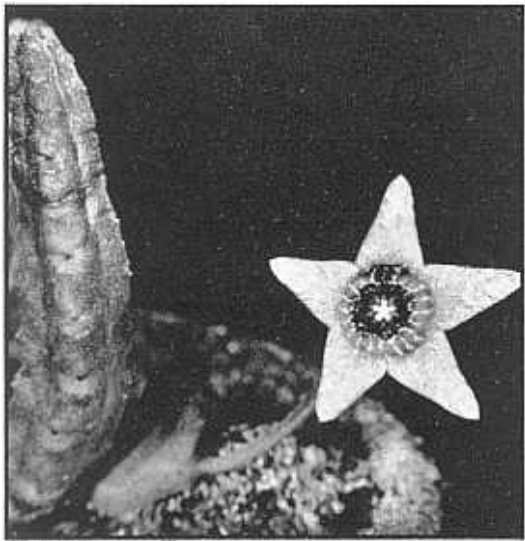


FIG. 253-A

Caralluma umdausensis Nel

The curious "Umdaus Caralluma" was discovered by H. Herre on his journey to the Richtersveld in September, 1929. The stems are not prominently toothed and recall those of *C. aperta*; the flowers are very

striking, with unique whitish stripes which radiate from the ring-like white central area of the otherwise reddish-purple corolla-tube up to the lower part of the yellowish-green lobes.

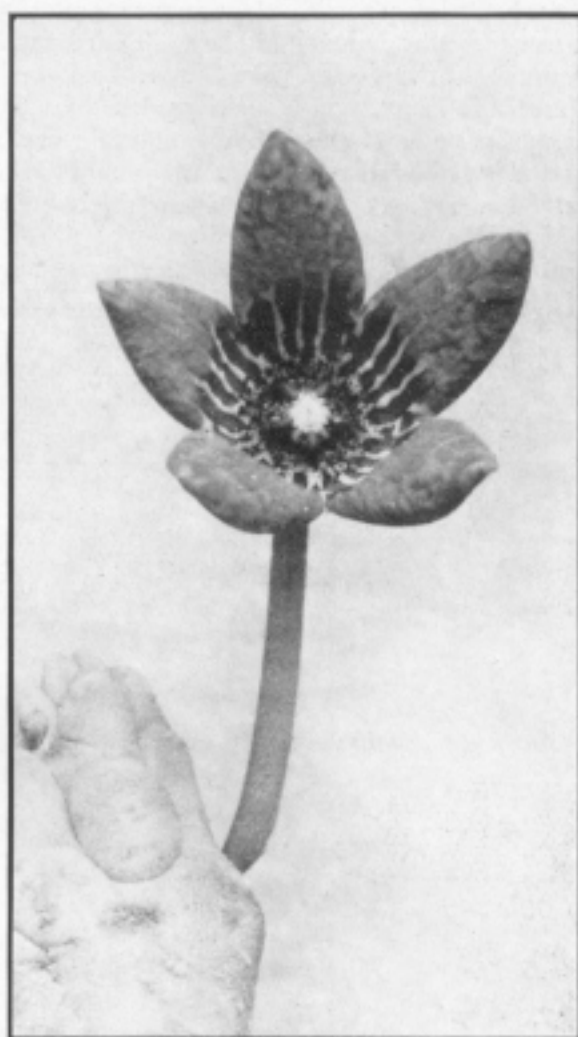


FIG. 254

Caralluma umdausensis Nel x 2.5

Photo by Carl Luckhoff.

79. *Caralluma wilfriedi* Dinter, Succ.-Forsch., i. 20. 1923.

Type locality: South West Africa: granite formation near Aus and Kubub.

Distribution: Not further known.

The two accompanying figures have come to us under the name of *Caralluma wilfriedi*, but as yet there has been no possibility of verifying the name, as Prof. Dinter has published no description of the species beyond a passing reference in his account of his 1922 expedition. Speaking of the succulents which abound on the granite hills between Aus and Kubub in Great Namaqualand, he said: "Here and there were big cushions of the tiny yellow-flowered *Caralluma* (*hottentotorum*), and

the somewhat larger brown-flowered new *C. wilfriedi* Dinter mss." The name of this plant commemorates Prof. Dinter's collecting-boy, Wilfried, familiarly referred to as his "Sammel-bambuse." Wilfried, with an ox-driver, ten oxen and an ox-cart laden with corn-meal, rice, tea, lard, tobacco, sugar, clothing, bedding, cooking utensils and a few reference books, made up the expedition which Prof. Dinter led through so many sections of South West Africa and which yielded such rich harvests.



FIG. 255

Caralluma wilfriedi Dinter

Photo by W. Triebner of a plant collected near Aus, Great Namaqualand. The identification is uncertain.

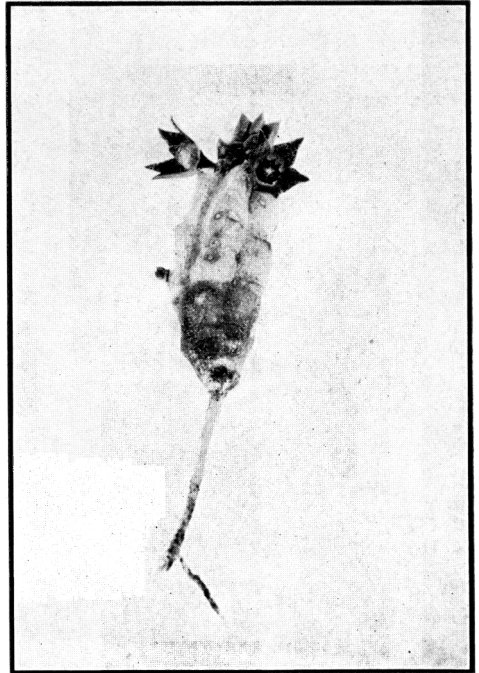


FIG. 256

Caralluma wilfriedi Dinter

Photo by S. Tapscott. The identification is uncertain.

80. *Caralluma arida* (Masson) N. E. Brown, Gard. Chron., xii. 369. 1892.

Stapelia arida Masson, Stap. Nov., 21. 1796.

Orbea arida Sweet, Hort. Brit., 1 Ed., 277. 1827.

Obesia arida Sweet, Hort. Brit., 2 Ed., 358. 1830.

Piaranthus aridus G. Don, Gen. Hist., iv. 114. 1838.

(Description by Dr. Brown, Flora Cap., iv. i. 879):

Stems: erect, somewhat crowded, 2 to 2½ in. high, 4-angled, about ½ to ⅔ in. square, with conical acute spreading teeth 1 to 2 lin. long, glabrous, grey-green?;

Flowers: along the grooves between the angles at the upper part of the stems, solitary, erect;

*Pedice*l: 3 to 4 lin. long, elongating in fruit;

Sepals: lanceolate, acute;

Corolla: about 5 lin. in diameter, apparently rotate, whitish-yellow, apparently dotted with red (or purple-brown?) at the base of the lobes, which are about 2 lin. long, ovate-lanceolate, acute, flat, pubescent at the tips.

Type locality: Cape Prov.: Riversdale or Ladismith Distr.: "Kannaland."

Distribution: Not further known.

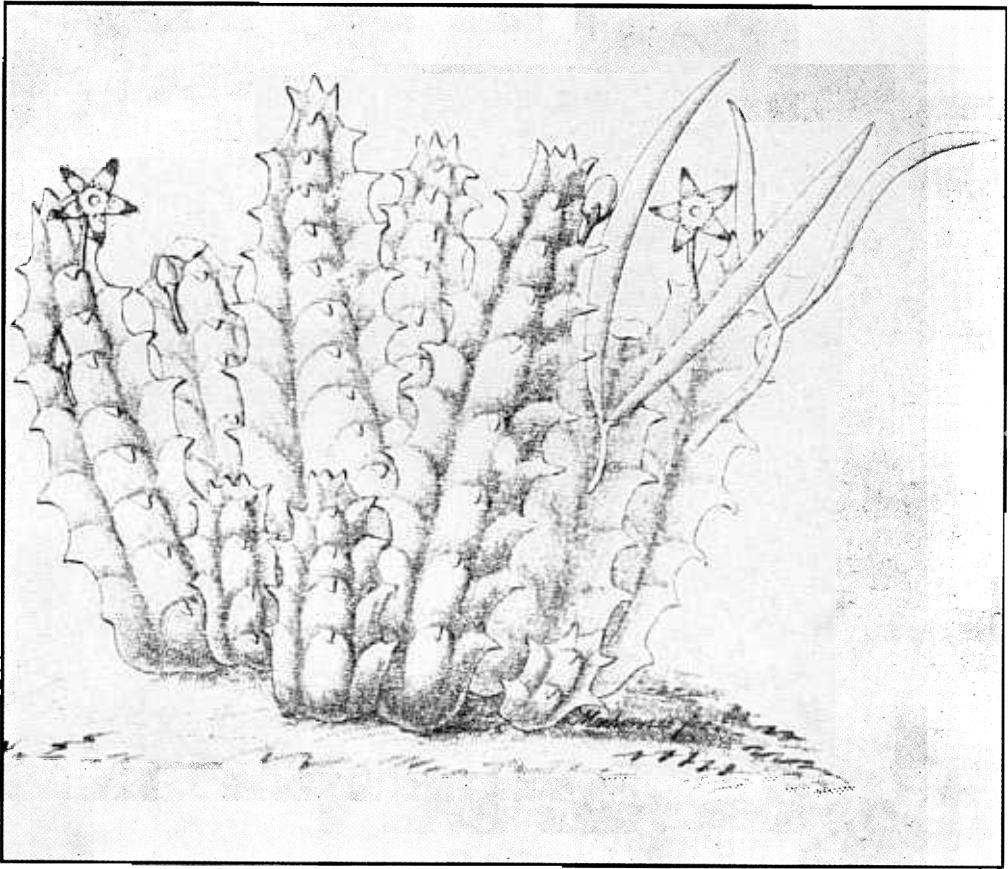


FIG. 257

Caralluma arida N. E. Brown x 1

From Masson: *Stapeliae Novae*, 1796.

The "arid *Caralluma*" is native, according to Francis Masson, to the dry deserts of Kannaland, by which he meant the south-westerly part of the Little Karroo. It has not been rediscovered since his day, and is only imperfectly known from his figure and

description. The $\frac{1}{2}$ -inch flowers are whitish-yellow, dotted with red or purple-brown at the base of the lobes, which are pubescent at the tips. The corona form is quite unknown.

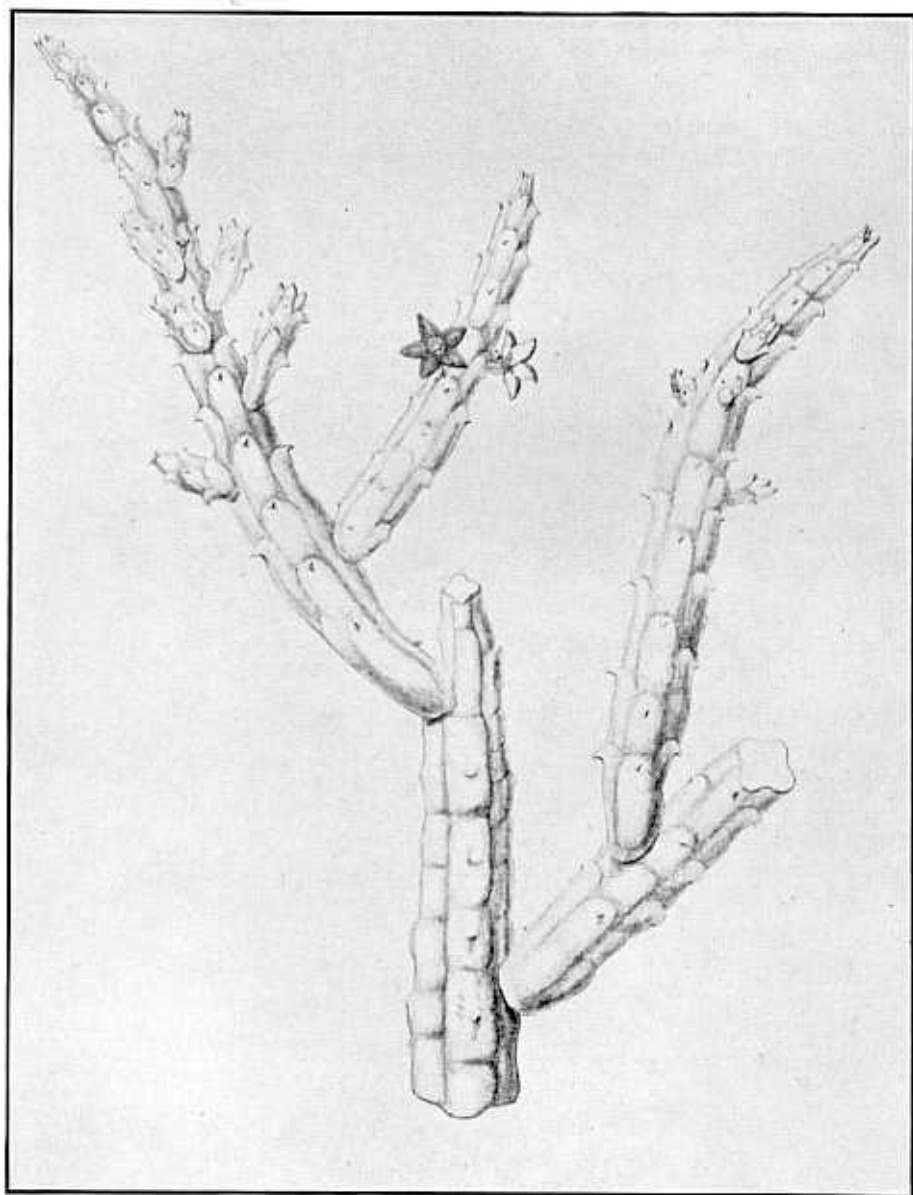


FIG. 258

Caralluma pruinosa N. E. Brown x 0.8

From Masson: *Stapeliae Novae*, 1796.

81. *Caralluma pruinosa* (Masson) N. E. Brown, Gard. Chron., xii. 370. 1892.*Stapelia pruinosa* Masson, Stap. Nov., 24. 1796.*Tromotriche pruinosa* Haworth, Syn. Pl. Succ., 37. 1812.

(Description by Dr. N. E. Brown, Flora Cap., iv. i. 881):

Plant: 1 to 1½ ft. high, bushily branched, glabrous, greyish-green, tinted with purple; *branches* obtusely 4-angled, 5 to 7 lin. square, with very small teeth, about 1 lin. long, hard and brown at the tips, flowering along the grooves between the angles;

Flowers: 1 to 3 together, successively developed;

*Pedice*l: 1 to 1¾ lin. long, glabrous;

Sepals: about ¾ lin. long, ovate, acute, glabrous;

Corolla: rotate, without a distinct tube, lobed to ¾ of the way down, 5 to 6 lin. in diameter, glabrous and more or less mottled with purple-brown outside, pubescent and entirely dark purple-brown all over the inner face; united or *disk* part nearly flat; *lobes* about 2 lin. long and 1½ lin. broad, deltoid-lanceolate, acute;

Outer corona: shortly cupular and combined with the base of the inner corona-lobes, with 5 minute subrectangular bifid lobes about ¼ lin. long, apparently erect, glabrous, blackish;

Inner corona: lobes ½ lin. long, linear-oblong, emarginate, bifid, irregularly toothed or subtruncate at the apex, closely incumbent upon the backs of the anthers and slightly exceeding them, dorsally produced at the base into a short horizontally spreading truncate or rounded ridge or crest, blackish.

Type locality: Cape Prov.: Little Namaqualand: without precise locality.

Distribution: Little Namaqualand: Komaggas.

Caralluma pruinosa was collected by Masson in Little Namaqualand and was rediscovered in 1900 by G. Alston, surveyor. It is the last species figured in Masson's book and he says of it: "This beautiful little species flowered in Kew Garden in June, 1797, after the last number of my little work had been sent to press, and I thought botanists would be pleased to have

me figure the species, whose flower I never saw while I was in Africa." The plant has bushily branched stems, up to a foot and a half tall. The ½-inch flowers are entirely dark purple-brown on the inner corolla face and pubescent with very short white hairs, "resembling white frost" as Masson described it, whence he gave the species the name of the "frosted *Caralluma*."

Var. a. *Caralluma pruinosa* var. *nigra* Luckhoff, var. nov.

(Description by C. Luckhoff) :

Corolla: smaller than in the type, 9 mm. in diameter, entirely jet-black on the inner face, pubescent but only about half as densely so as in the type; *lobes* $3\frac{1}{2}$ mm. long, 2 mm. broad, very acute; Otherwise as in the type.

The type specimen of this new "black variety" is No. 203-A in the Luckhoff Herbarium. It was discovered by P. van Heerden in 1934 in Little Namaqualand, 60 miles from Springbok on the road to Port Nolloth, and it flowered in January, 1935,

in Dr. J. Luckhoff's garden in Capetown. It is interesting because of its color, which is jet-black on the whole inner surface of the corolla, a shade found in few other Stapeliads. The pubescence is white, as in the type.

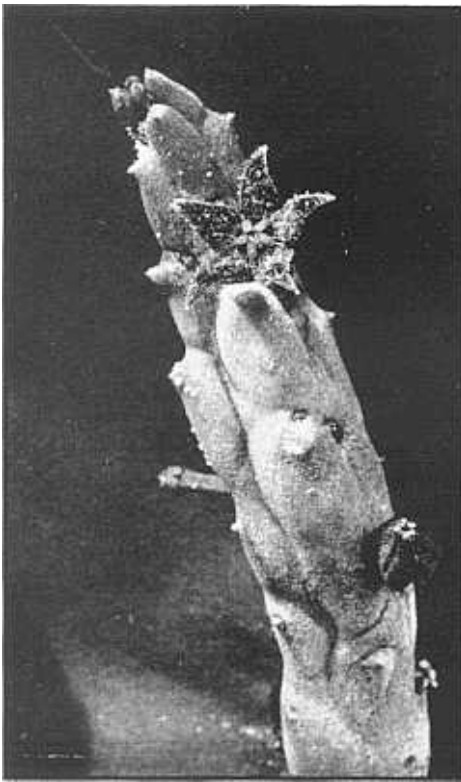


FIG. 259

Caralluma pruinosa var. *nigra* Luckhoff x 2.

Photo by Carl Luckhoff.

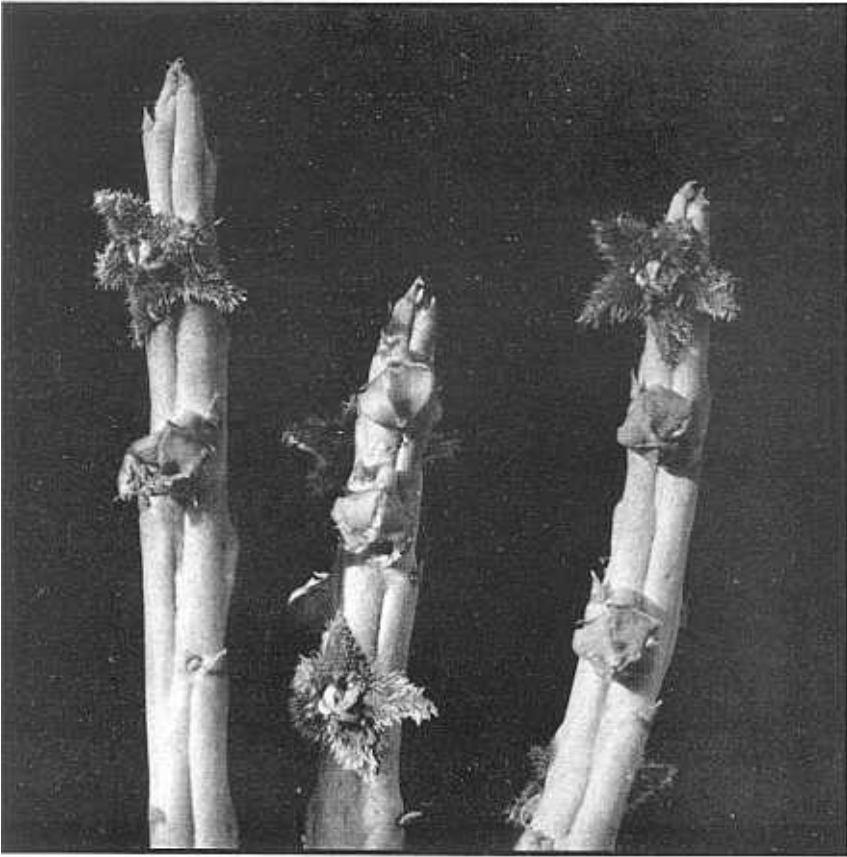


FIG. 260

Caralluma peschii Nel x 2.4

From Omaruru, S. W. Afr. Photo by Carl Luckhoff in Kakteen Jahrbuch, 1936.

82. *Caralluma peschii* Nel, Kakteen-Jahrb., 41. 1936.

(Description by Dr. G. C. Nel, l.c., translated from the Latin and German) :

Plant: branching in the shape of a bush; *stems* 5 to 7 cm. high, 2 to 5 mm. thick, erect, rod-like, greyish-green, 4-angled; angles not prominent, divided by slight furrows;*Flowers*: in fascicles of 6 to 8 at the upper part of the stems;*Pedice*l: 1 to 2 mm. long, glabrous;*Sepals*: about 4 mm. long, 2 mm. broad, lanceolate, acute;*Corolla*: 9 mm. in diameter; *lobes* 4 to 5 mm. long, 2 to 3 mm. broad, ovate, acute; outside glabrous, yellowish-green; inside yellowish-green, shaggy with many stiff white hairs, each hair arising from a globular brown gland;*Outer corona*: lobes 1 mm. long, linear, yellowish-green with dark brown bifid or trifold recurved tips;*Inner corona*: lobes subulate, incumbent on the anthers and not produced above them, whitish with a brown edge.*Type locality*: South West Africa: Hereroland: near Omaruru.*Distribution*: Not further known.

"Pesch's *Caralluma*" is named for its discoverer, C. Pesch of Omaruru, Hereroland, who collected it near Omaruru in October, 1933. The plant is rather rare, as it is eaten by the natives. The stems are

not prominently toothed, and bear tiny rudimentary leaves, suggesting the stems of *Stapelia kwebensis* rather than those of any other *Caralluma*. The densely shaggy appearance of the flowers is very effective.

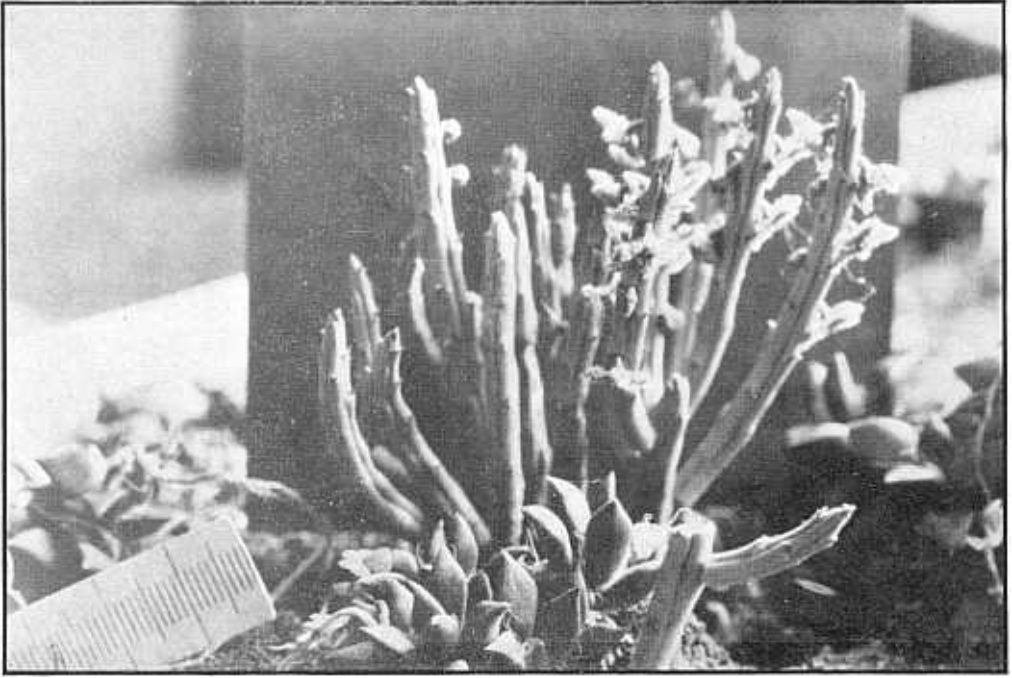


FIG. 261

Caralluma peschii Nel

Photo by H. Herre.

83. *Caralluma marlothii* N. E. Brown, Gard. Chron., xxxiv. 414. 1903.

(Description by Dr. Brown, Flora Cap., iv. i. 886):

Plant: about 3 to $3\frac{1}{2}$ in. high, branching at the base; *branches* rather crowded, decumbent at the base, acutely 4-angled, $\frac{1}{2}$ to $\frac{3}{4}$ in. square, with nearly flat or slightly grooved faces, glabrous, entirely dull violet or more or less mottled with that color where exposed to the sun; angles armed with conical acute teeth about 2 to 4 lin. apart and 1 to 2 lin. long, hardened and whitish at the tips;

Flowers: in numerous fascicles of 2 to 4, scattered along the middle of two or all four faces of the branches, developing successively;

Pedicel: $\frac{1}{3}$ to $\frac{1}{2}$ in. long, erect, slightly curved, slender, glabrous;

Sepals: about $\frac{3}{4}$ lin. long, nearly $\frac{1}{2}$ lin. broad at the base, thence tapering to an acute point, glabrous;

Corolla: rotate, with very revolute lobes, about $2\frac{1}{2}$ lin. (or $3\frac{1}{2}$ to 4 lin. with the lobes flattened out) in diameter, light green, marked to the tips of the lobes with small dark purple-brown lines and spots which show through on the glabrous outside, thinly covered on the inner face with erect stiffish but fine purple hairs; *lobes* rolled back to the pedicel, $1\frac{1}{2}$ to 2 lin. long, 1 lin. broad, oblong-lanceolate, acute, slightly thickened at the apex, where the hairs are slightly tufted;

Outer corona: lobes about $\frac{2}{3}$ lin. long, $\frac{1}{5}$ lin. broad, erect, linear from a broadened base, deeply bifid at the apex, with diverging and recurving filiform points, glabrous, yellow;

Inner corona: lobes somewhat hammer-shaped in side view, with the linear-lanceolate or linear entire or subbifid tips horizontally incumbent on the backs of the anthers and dorsally produced

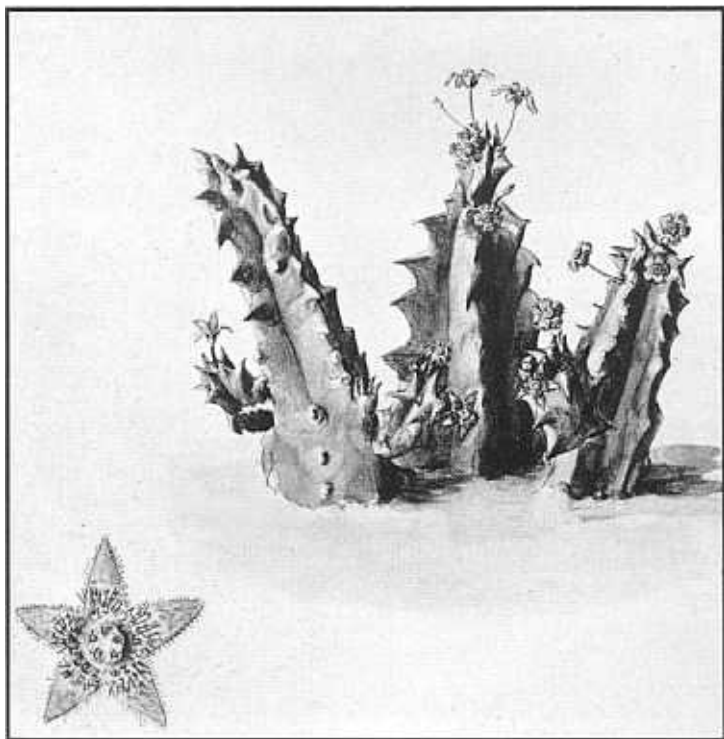


FIG. 262

Caralluma marlothii N. E. Brown x 1.

From the original water color drawing by Miss Cythna Letty for the Flowering Plants of South Africa, 1932.

into a short stout obtuse arm, which sometimes shows a tendency to become bifid, glabrous, yellow, with faint brown markings;

len-masses: very conspicuous, globose, dull yellowish.

Type locality: Cape Prov.: Ceres Distr.: stony places near Zwartkops Drift in the Bokkeveld Karroo.

Distribution: Also in Laingsburg Distr. between Witte Poort and Laingsburg; near Matjesfontein; Whitehill area; Prince Albert Distr.; Willowmore Distr.; Calvinia Distr.: on road from Ceres to Calvinia

"Marloth's *Caralluma*," from the western Karroid areas, was discovered by Dr. Marloth in 1903. The 3-inch stems bear small clusters of 2 to 4 flowers along the sides. The flowers are about $\frac{1}{2}$ -inch in diameter, light green on the inner face, marked with small purple-brown lines and spots and covered, especially around the centre, with purple and white clavate hairs, the corolla-lobes ciliate with similar hairs. Dr. Brown's description and that of Dr. Marloth indicate that the color scheme con-

the Cape, the Ceres Karroo, north of Karroopoort. The maximum annual rainfall during ten years at the only recording station in the area was 6 inches, the minimum less than 1 inch. "Yet there are 8,000 fig trees, 10,000 almond trees, 25,000 apricots and 200,000 vines on the estate."



263

N. Brown x



FIG. 264

D. and Mrs. Rudolf Marloth

Photo by P. Niehaus.

tinues to the tips of the lobes; but Miss Letty's drawing in the Flowering Plants of South Africa shows the tips of the lobes as uniformly darker. Dr. Marloth says that the species inhabits a most arid section of

84. *Caralluma simulans* N. E. Brown, *Flora Cap.*, iv. i. 880. 1909.

(Description by Dr. Brown, l.c.):

Stems: erect, closely placed, branching at the base, 4-angled, 2 to 3 in. high, 5 to 7 lin. square, with flattish sides and acute angles with horizontally spreading conical acute hard pointed teeth 1 to $1\frac{1}{2}$ lin. long, glabrous, green or tinted with purple-brown, slightly glaucous;

Flowers: single, apparently produced in succession during more than one year from the several flower-cushions along the sides of the stems;

Pedicel: 2 to 4 (in fruit 6 to 8) lin. long, slender, erect, about $\frac{2}{5}$ lin. thick, glabrous;

Sepals: $\frac{3}{4}$ lin. long, extending to the sinuses of the corolla, lanceolate or ovate-lanceolate, acute, glabrous;

Corolla: $3\frac{1}{2}$ lin. in diameter, deeply lobed, rotate, without a distinct tube; *lobes* more or less recurving, $1\frac{1}{2}$ lin. long, 1 lin. broad, ovate or ovate-lanceolate, acute, slightly thickened at the apex, glabrous and smooth on the back, smooth on the inner face, but thinly sprinkled with erect rather long hairs on the basal half and with a few minute hairs at the tips, light yellow (*Marloth*);

Outer corōna: lobes erect, $\frac{1}{2}$ to $\frac{3}{4}$ lin. long, linear, deeply bifid, with slender diverging teeth;

Inner corona: lobes closely incumbent upon the backs of the anthers and shorter than them, with the inflexed part about $\frac{1}{4}$ lin. long, linear-oblong, obtuse, having a transverse ridge on the back at the bend;

Follicles: about $3\frac{1}{2}$ in. long, erect, subparallel, slender, about $1\frac{1}{2}$ to 2 lin. thick, linear-terete, acute, smooth, glabrous; *seeds* 2 to $2\frac{1}{4}$ lin. long, scarcely 1 lin. broad, ovate, concave with incurved thickened margins on one side, convex on the other, smooth, glabrous, brown.

Type locality: Cape Prov.: Prince Albert Distr.: near Prince Albert.

Distribution: Not further known.

The "simulating *Caralluma*" was discovered by Dr. Marloth in the Great Karroo near Prince Albert. It is very closely allied to *Caralluma arida*, from which fact it derives its name. According to Dr. N. E.

Brown it differs from Masson's figure and description of *C. arida* "in having much smaller flowers, without spots at the base of the lobes and with hairs at the base as well as at the tips of the lobes."

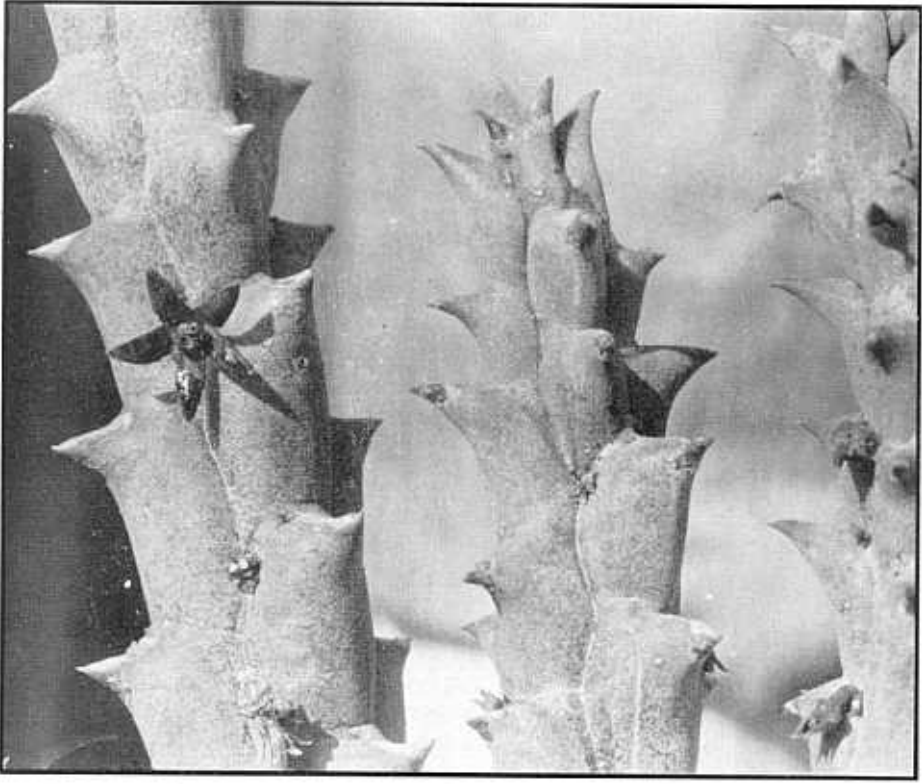


FIG. 265

Caralluma dependens N. E. Brown var. x 2.

Photo by Dr. Luckhoff of a varietal form discovered by R. Primos near Klaver, Van Rhynsdorp Distr. The corolla-lobes are longer and more slender than in the type, and the color of the tube and basal part of the lobes is grass-green, not yellowish or yellowish-green, as in the type.

85. *Caralluma dependens* N. E. Brown, Icon. Pl., t. 1903. 1890.

Caralluma parviflora Schlechter, Journ. Bot., 478. 1898. Nec N. E. Brown, 1892.

(Description by Dr. Brown, Flora Cap., iv. i. 878) :

Plant: 8 to 12 in. high, compactly branched; *branches* erect; 4-angled, 5 to 9 lin. square excluding the teeth, glabrous, at first dull green tinted with purple, becoming pale grey or pale purplish-grey with age; angles rounded, with stout conical horizontal or slightly recurved acute teeth 1 to 2 lin. long, which become hardened at the point;

Flowers: successively developed from very small flowering points arranged along the grooves between the angles which produce flowers for two or more successive years, pendulous and closely applied to the stems;

Pedicel: 1 to 1½ lin. long, abruptly bent downwards from their base, becoming erect and 4 to 5 lin. long in fruit, glabrous;

Sepals: ¾ lin. long, lanceolate, acute, glabrous;

Corolla: in bud oblong, obtuse, pendant and closely applied to the stem; when expanded rotate, without any tube, with 4 lobes reflexed and 1 (the lower) pressed against the stem, 2 to 2¼ lin. long, 1 lin. broad, oblong-linear, subacute, convex, glabrous and green, tinted with purplish on the back; inner face smooth, light yellowish-green, marked with transverse purple-brown lines on the disk and basal half of the lobes, dark purple-brown on the apical half, ciliate with long soft twisted or curly purple hairs;

Outer corona: lobes erectly spreading, bifid to half-way down, basal part subquadrate, yellowish; teeth subulate, acute, arching-divaricate, purple-black;

Inner corona: lobes deltoid-subulate, acuminate, purple-black, closely incumbent on the backs of the anthers and not exceeding them;

Follicles: diverging, $3\frac{1}{4}$ to $5\frac{1}{3}$ in. long, about $\frac{1}{4}$ in. thick, terete, tapering to an acute point.

Type locality: Cape Prov.: Clanwilliam Distr.: on a farm 20 miles west of Clanwilliam.

Distribution: Recorded from several other points in the same district; and in Van Rhynsdorp Distr.: foot of the Bokkeveld Mountains. (A related form is reported from Little Namaqualand: Richtersveld).

The "pendulous *Caralluma*" was first collected in Sir Henry Barkly's day near Clanwilliam, 25 or 30 miles inland from Lambert's Bay in the westerly part of the

Cape Province. The stems are up to a foot high, with rounded angles and stout conical teeth. The flowers, as the name suggests, are drooping and the curious way in which the lower lobe of the corolla is pressed against the stem, while the four others are reflexed, is according to Dr. Brown (*Icones Plant.*) "different from that of any other species of the whole tribe known to me." The corolla is yellowish-green with purple-brown lines at the base and dark purple-brown near the upper half of the lobes, ciliate with long soft curly purple hairs, but otherwise glabrous. The corona is said to be exactly the same as in the typical Indian species of *Caralluma*, *C. adscendens*.

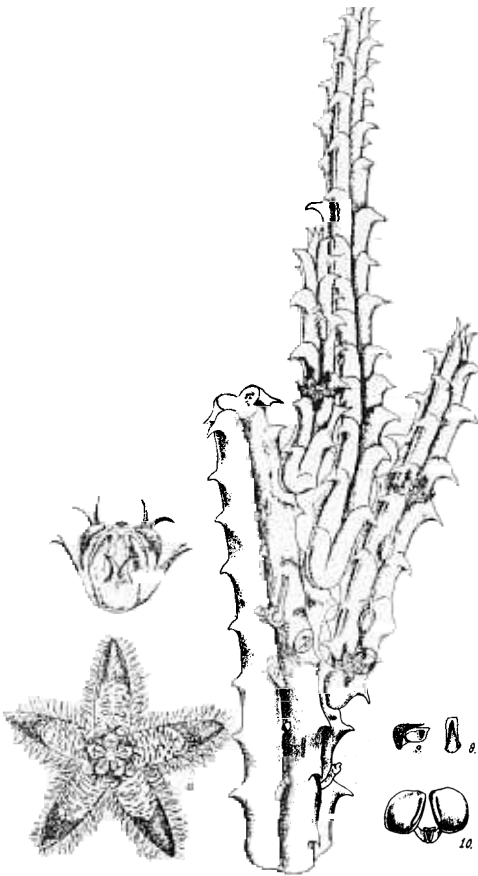


FIG. 266

Caralluma dependens N. E. Brown

From Hooker's *Icones Plantarum*, 1890.

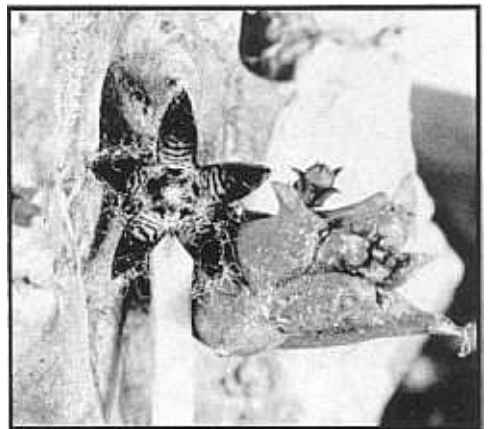


FIG. 267

Caralluma dependens N. E. Brown x 2.

86. *Caralluma intermedia* (N. E. Brown) Schlechter, Journ. Bot., 478. 1898.*Stapelia intermedia* N. E. Brown, Icon. Pl., t. 1910. 1890.

(Description by Dr. Brown, Flora Cap., iv. i. 877):

Stems: or branches not seen, but according to a drawing 5 to 6 in. long, 4-angled, about $\frac{1}{2}$ in. square, with stout spreading acute teeth about 2 lin. long, glabrous;

Flowers: along the grooves between the angles towards the top;

Pedical: not seen, about $\frac{1}{2}$ in. long in the drawing;

Sepals: about $1\frac{1}{2}$ lin. long, 1 to $1\frac{1}{4}$ lin. broad, broadly ovate, acuminate, glabrous;

Corolla: about 1 in. in diameter, nearly flat, without a distinct tube, but with a depression in the disk, rugulose on the inner face, glabrous (ciliate?), according to the drawing dull green spotted with purple-brown; lobes 4 to 5 lin. long and $\frac{1}{4}$ in. broad at the base, ovate or deltoid-ovate, acute;

Outer corona: lobes $\frac{1}{2}$ to $\frac{3}{4}$ lin. long, $\frac{2}{3}$ to $\frac{3}{4}$ lin. broad, 3-toothed, with the middle tooth entire, crenulate or bifid, deltoid, much larger than the lateral teeth; sometimes all connate into a cup above the attachment to the inner corona-lobes, with 5 large deltoid acute teeth alternating with 5 pairs of minute teeth;

Inner corona: lobes $\frac{1}{2}$ lin. long, lanceolate-subulate, closely incumbent on the backs of the anthers and not, or scarcely, produced beyond them, dorsally adnate at the base to the outer corona.

Type locality: Cape Prov.: Clanwilliam

Distr.: Olifants River.

Distribution: Not further known.

The "intermediate *Caralluma*," from the west coast region of the Cape, 100 miles above Capetown, is the classic example of the easy transition from *Caralluma* to *Stapelia*. The plant was first sent about 1875 to Sir Henry Barkly at Capetown by Mr. Reynolds of Namaqualand. It only remains known from some dried flowers and a drawing by Miss Barkly, from which Dr. N. E. Brown's plate and description were made. The 4 to 6 inch *Caralluma*-like stems, with stout spreading teeth, and the 1-inch flowers, dull green with purple-brown spots, slightly concave on the disk, are unimportant in comparison with the extraordinary "intermediate" form of the corona. The lobes of the inner corona are incumbent on the backs of the anthers and have a dorsal attachment to the lobes of the outer corona.

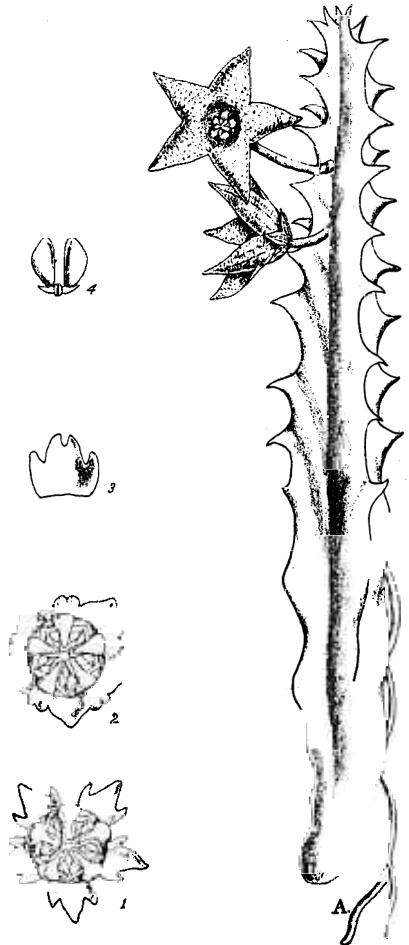


FIG. 268

Caralluma intermedia Schlechter x 1.

From Hooker's Icones Plantarum, 1890.

Usually the outer corona has deeply cleft lobes, three-toothed at the apex, with the lateral teeth small, a form characteristic of the *Tridentea* group of the *Stapelias*. But in some flowers these lobes are found inter-

grown up to a point above the dorsal attachments from the inner corona, thus forming a toothed cup wholly typical of the most conservative *Carallumas*. (See Fig. 268: 1 and 2).

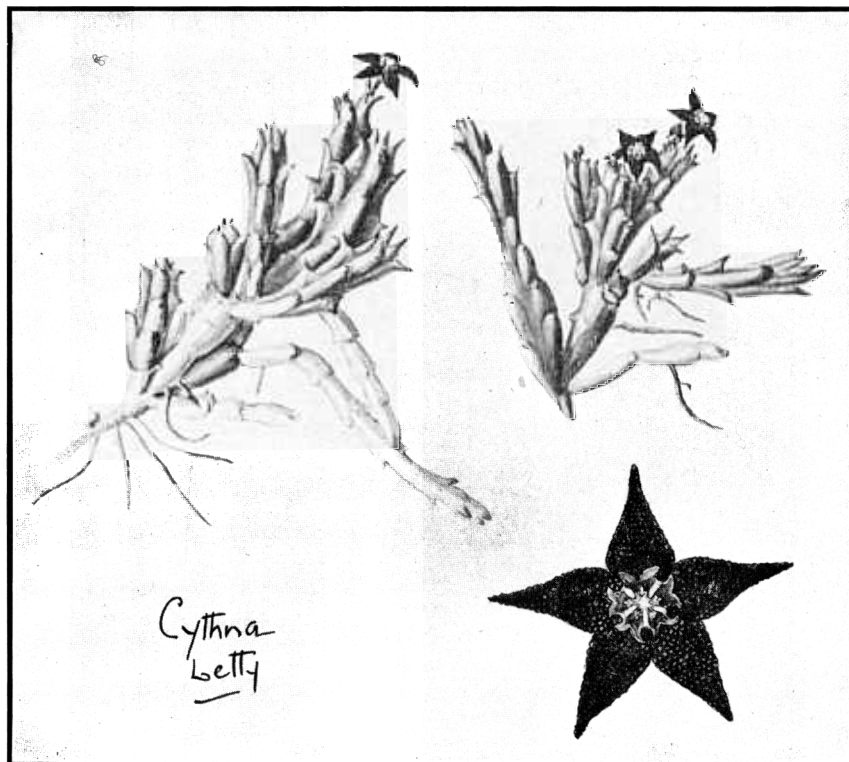


FIG. 269

Caralluma ubomboensis Verdoorn x 1.

the original water color drawing by Miss Cythna Letty for the
Flowering Plants of South Africa, 1932.

87. *Caralluma ubomboensis* Verdoorn, Flow. Pl. So. Afr., t. 443. 1932.

(Description by Miss I. C. Verdoorn, l.c.):

Plant: about 4 cm. high; *branches* 4-angled, 1 cm. in diameter, with a few conical teeth on the angles; *teeth* tipped with small erect leaves;

Flowers: erect, arising in groups of 2 or 3, near or at the apex of the stems;

Pedicel: about 5 mm. long;

Sepals: 2 mm. long, ovate;

Corolla: about 9 mm. in diameter when fully expanded, dark purple, rugose, glabrous; *lobes* 3 to 4 mm. long, ovate;

Corona: about midway on the staminal column;

Outer corona: dark purple, of 5 united spreading deeply bifid lobes, with the segments diverging;

Inner corona: 5-lobed; lobes $\frac{1}{2}$ mm. long, oblong, obtuse, incumbent on the anthers and joined at the base to the outer corona.

Type locality: Natal: Ubombo Mountains.

Distribution: Also in Swaziland: Ubombo Mountains: near Stegi.

The "Ubombo *Caralluma*" is a very distinctive small-flowered species from the northern extremity of Natal (Zululand) from Swaziland. It was discovered in the Ubombo Mountains, which separate the March, 1930, by Dr. I. B. Pole Evans. The

short $1\frac{1}{2}$ -inch stems have obtuse angles with a few conical teeth tipped with erect rudimentary leaves. The $\frac{1}{3}$ -inch flowers are dark purple, rugose on the inner face, and although glabrous are described by Miss Verdoorn as resembling "small vel-

vety stars." The outer corona is dark purple, the lobes spreading and deeply bifid, with the segments diverging; the inner coronalobes are incumbent on the anthers and dorsally adnate at the base to the outer corona.

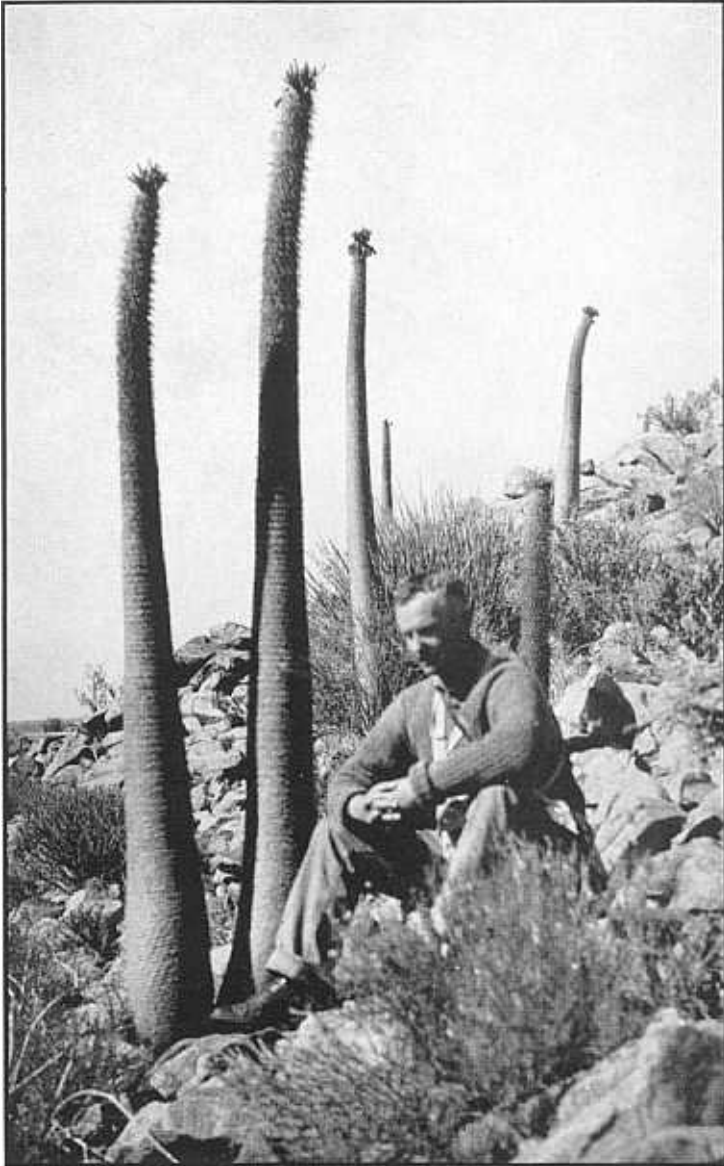


FIG. 269-A

Dr. I. B. Pole Evans,
in a colony of *Pachypodium namaquanum*,
in the valley of the Orange River, Little Bushmanland.

88. *Caralluma maculata* N. E. Brown, Flora Trop. Afr., iv. i. 487. 1904.

Caralluma grandidens Verdoorn, Flow. Pl. So. Afr., t. 518. 1933.

(Description by Miss I. C. Verdoorn, l.c.):

Plant: forming long rhizomes; *stems* in tufts of 7 to 12, simple or branched at the base, about 7 cm. long, 4-angled, green with purple-brown markings; teeth up to 1.5 cm. long, deltoid, mucronate, with 2 minute teeth just below the apex;

Flowers: usually 3, arising about midway on the stems, developing in succession from a stout glabrous peduncle under 1 cm. long;

Pedicel: about 5 cm. long, 2 mm. in diameter, green with small purple-brown spots at the apex; glabrous;

Sepals: about 1 cm. long, lanceolate;

Corolla: in bud oblong in outline, distinctly 5-angled; when expanded 5 cm. in diameter, yellowish-green with small purple-red spots; *disk* flat; *lobes* 2.2 cm. long, 7 mm. broad, oblong, spreading-recurved, with reflexed margins; finely rugose on face, shortly ciliate and with long white vibratile hairs on the lower two-thirds;

Corona: dark purple-red, appearing 1-seriate;

Outer corona: shallowly basin-shaped, with recurved margins;

Inner corona: fused with the outer corona at the base and then produced into 5 oblong-spatulate lobes.

Type locality: Bechuanaland Protectorate: near T'Klakane Pits in the northern Kalahari Desert.



FIG. 270
Caralluma maculata N. E.
Brown x 0.85

From the original water color
drawing by Miss Cythna Letty
for the Flowering Plants of
South Africa, 1933.

Distribution: Also from Bechuanaland Protectorate: Boatlaname, 70 miles north of Molepolole; Transvaal: Zoutpansberg Distr.: in sandy soil between Zoutpan and Waterpoort.



FIG. 271

Caralluma maculata N. E. Brown x 1.8

Photo by Herbert Lang.

First collected by Major Lugard in the northern Kalahari Desert, 1896-97, and re-discovered by Miss A. A. Obermeijer, Dr. H. G. Schweickerdt and Miss I. C. Verdoorn during an expedition made to the neighborhood of the Zoutpan in the northern Transvaal in 1932. According to Miss

Verdoorn, "this rather striking species of *Caralluma* occurs in sandy areas at the foot of the northern slopes of the Zoutpansberg. While the aerial parts appear to grow in isolated tufts, an examination shows that they are connected by long jointed underground stems. Usually the clumps are

found in fully exposed patches of deep sand somewhat impregnated with lime, though occasionally they are found in the shade of trees. Though the plants are scattered, they are quite plentiful." The stems of *C. maculata* have powerful teeth, over a half-inch long, with two little denticles just below the apex. The species derives

its name, the "spotted Caralluma," from the fact that the very deeply lobed yellowish-green flowers are spotted on the entire inner face, from the tips of the lobes to the bottom of the central tube, with small dark claret-colored dots. The corona is an extraordinary one, and will be discussed on page 340.

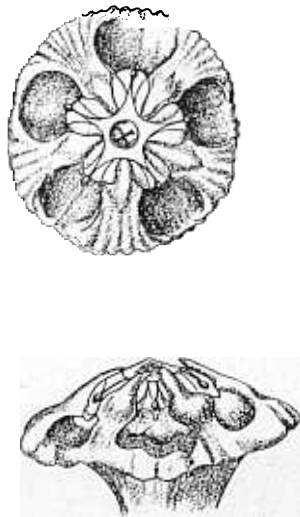


FIG. 272

Corona of *Caralluma maculata*
N. E. Brown

Side view (below) and as seen from above. From a drawing by Miss Cythna Letty in the Flowering Plants of South Africa, 1933.

89. *Caralluma rangeana* Dinter et Berger, Engler: Jahrb. L. Suppl., 591. 1914.*Caralluma rangei* Dinter et Berger, Neue Pfl. Deutsch-Südwest-Afr., t. 50. 1914.

(Description by Prof. K. Dinter and A. Berger, Neue Pfl., 18, translated from the German):

Plant: forming low tufts 8 to 10 cm. high; *stems* 4-angled, glabrous, grey-green with brown markings; with broad triangular teeth;*Flowers*: few together from the base of the young stems;*Pedicel*: 3 to 4 cm. long, 3 mm. thick, marked with red lines;*Sepals*: 5 to 6 mm. long, $1\frac{1}{2}$ to 2 mm. broad at the base, acuminate, glabrous, recurved at the tips;*Corolla*: deeply lobed, without trace of a tube, 46 mm. in diameter from point to point, $2\frac{1}{2}$ cm. radius; *lobes* 2 cm. long, with margins strongly bent downwards, obtuse, 1 cm. broad when stretched out flat, heavily ciliate with clavate hairs 2 mm. long directed downwards; ground-color greenish-yellow, with long concentric dark red-brown markings which almost resemble zebra stripes; both the greenish-yellow areas and the markings thickly covered with fine papillae, many of which end in a little white point, but many of the larger markings are furrowed lengthwise by a non-papillate groove;*Corona*: flat, 5 mm. in diameter, $1\frac{1}{2}$ mm. high, not shiny, bright, brownish-yellow, standing wholly free, its upper surface $1\frac{1}{2}$ cm. vertically higher than the tips of the sharply deflexed corolla-lobes;*Outer corona*: wholly absent;*Inner corona*: lobes covering the anthers, broad, obtuse, with 3 tiny obtuse teeth at the apex.

Type locality: South West Africa: Kuibis.

Distribution: Recorded also from Kanus; and the westerly side of the Little Karas Mts.

This remarkable *Caralluma*, named in honor of Dr. Paul Range, specialist in the botany of South West Africa, was collected by Prof. Kurt Dinter inland from Lüderitz Bay in March, 1913, and is also recorded

from the country south of the Great Karas Mountains and from west of the Little Karas Mountains. The flowers are borne on 1-inch pedicels and measure nearly 2 inches in diameter. The corolla-lobes are deeply cleft, as in *C. maculata*, bent back at the margins and recurved at the tips, with the corona prominently aloft at the centre. The inner surface of the corolla is greenish-yellow, with broad concentric bands of dark red-brown, densely papillate. The coronas of *C. rangeana* and *C. maculata* are of the same order. They consist of 5 lobes, incumbent on the anthers and equivalent to an inner corona, with lateral extensions from either side at the base, which meet and merge with the extensions from adjacent lobes, forming the equivalent to a rudimentary ring-like outer corona. The structure is well seen in Miss Letty's dissection in Fig. 272, but it is difficult to put clearly into words. Dr. N. E. Brown, speaking of *C. maculata*, called the outer corona "cupular, circular in outline." Miss Verdoorn

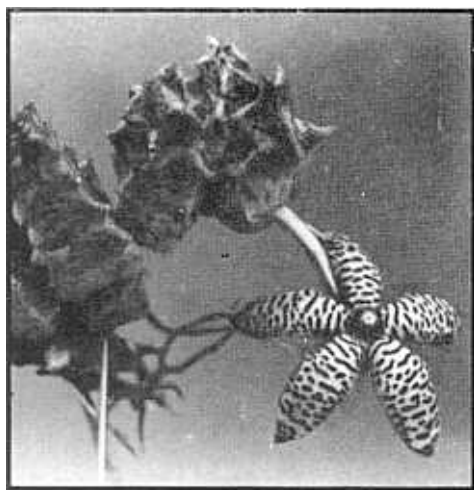


FIG. 273

Caralluma rangeana Dinter et Berger x 0.75Photo by Prof. Dinter in Neue Pfl.
D. S.-W. Afr., 1914.

defines it as "shallowly basin-shaped, with recurved margins" and as "resembling a ring," and she says the entire corona appears "1-seriate." The authors of *C. rangeana* (in Engler's Jahrbuch) called the entire corona of that species "single," and said in part, "the base of the corolla is somewhat rounded up, forming a pentagonal ring around the staminal column, entirely overlaid by the reversed plate-shaped co-

rona, which has its lobes incumbent on the anthers at the tips and laterally connate at the base."

Caralluma rangeana differs from *C. maculata* in having the corolla-lobes marked with bands of red-brown, somewhat resembling zebra stripes, while the markings of *C. maculata* are uniformly small dots. *C. rangeana* also has its stems much less strongly toothed.

90. *Caralluma aperta* (Masson) N. E. Brown, Icon. Pl., t. 1905. 1890.*Stapelia aperta* Masson, Stap. Nov., 23. 1796.*Orbea aperta* Sweet, Hort. Brit., 1 Ed., 277. 1827.*Caruncularia aperta* Sweet, Hort. Brit., 2 Ed., 359. 1830.

(Description by Dr. Brown, Flora Cap., iv. i. 887):

Stems: erect, or decumbent at the base, 2 to 2½ in. long, very obtusely 4-angled, light glaucous green, scarcely toothed;*Flowers*: apparently solitary near the base of the stems;*Pedicel*: 1 to 2 in. (3 in., *Masson*) long, erect or ascending, glabrous;*Sepals*: 1 to 1½ lin. long, ovate, acute, glabrous;*Corolla*: 1¼ to 1½ in. in diameter, quite glabrous; *tube* about ⅓ in. long and 5 to 6 lin. in diameter, cup or somewhat funnel-shaped, densely papillate and usually purple-brown at the basal half within, whitish or yellowish above, marked (sometimes labyrinthically) with small impressed irregular purple-brown lines and dots; *lobes* very spreading, 5 to 7 lin. long, 3½ to 4½ lin. broad, ovate-oblong, acute, with more or less reflexed margins, rugulose and with 3 impressed nerves on the inner face, apparently purplish-brown or olive-brown;*Outer corona*: cupular, acutely pentagonal, about equaling the staminal column, truncate and crenately denticulate at the top with a short acute tooth at each angle, apparently whitish;*Inner corona*: lobes 1¼ to 1½ lin. long, linear-filiform or very slightly clavate, closely incumbent on the anthers at the base, then connivent-erect above them, dorsally connected with the outer corona, dark purple-brown.

Type locality: Cape Prov.: Little Namaqualand: near Kokfontein, south of the Zwart Lintjes River.

Distribution: Also from near Kourkam; near Hondeklip Bay; Springbok; and the Richtersveld.

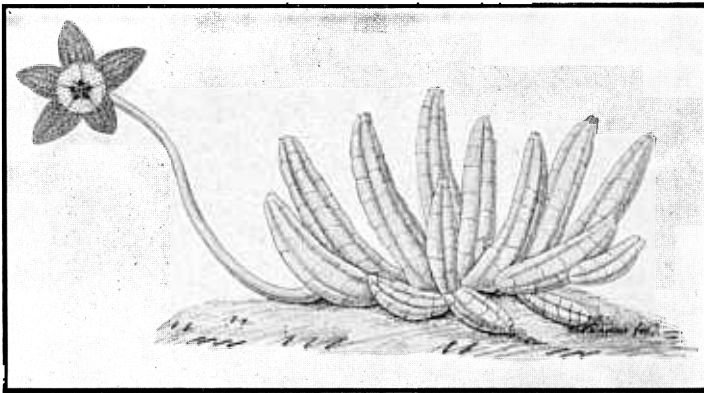


FIG. 274

Caralluma aperta N. E. Brown x 0.5

From Masson: Stapeliae Novae, 1796.

The "open *Caralluma*" was obtained by Masson from Little Namaqualand, and it has been recorded from a number of stations there. It resembles *Stapelia pedunculata* in its obtusely angled and scarcely toothed stems, in the long erect pedicels,

and somewhat too in the contrasts of its coloring; but the cup-shaped outer corona, with truncated and toothed upper margin, and the connivent-erect inner corona-lobes are wholly distinct from the coronal form of *S. pedunculata*. The flowers are up to

1½ inches in diameter, densely papillate in the tube with tiny globular glossy black papillae. The apical half of the corolla lobes is darker than the basal half due to microscopic purple-brown spots on the lighter area. The outside of the corolla is spotted at the base of the lobes and on the upper portion of the funnel-shaped tube. Just how to classify the species has puzzled taxonomists not a little, and Dr. N. E. Brown's verdict was that he considered it as "an aberrant species of *Caralluma*." Carl Luckhoff's photographic study in line and shadow shows what an exquisite plant it is. (See Frontispiece of this volume).



FIG. 275

Corona of *Caralluma aperta* N. E. Brown
Side view (left) and as seen from above. From a drawing by Miss Cythna Letty in the Flowering Plants of South Africa, 1932.

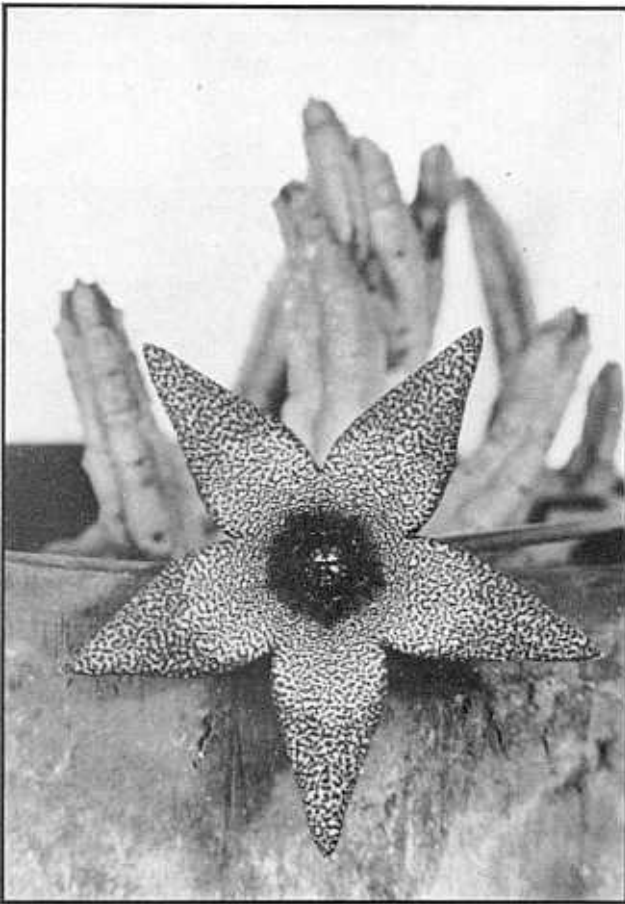


FIG. 276

Caralluma aperta N. E. Brown x 2.

91. *Caralluma arenicola* N. E. Brown, Flora Cap., iv. i. 883. 1909.

(Description by Dr. Brown, l.c.):

Plant: about 3 to 4 in. high, with numerous erect 4-angled stems $\frac{3}{4}$ to 1 in. (or more?) square, glabrous, green, slightly glaucous, branching at the base; sides flat below, grooved above; teeth very spreading, $1\frac{1}{2}$ to $2\frac{1}{2}$ lin. long, stout, conical, hardened at the acute tips;

Flowers: in small clusters along the sides of the stems;

Pedicel: $\frac{1}{2}$ to $1\frac{1}{2}$ lin. (in fruit elongating to $\frac{1}{2}$ to 1 in.) long, stout, glabrous;

Sepals: $1\frac{1}{4}$ to $1\frac{1}{2}$ lin. long, $\frac{1}{2}$ lin. broad, ovate-lanceolate, acuminate, glabrous;

Corolla: minutely papillate-tuberculate (or rarely with very minute hairs) at the base of the lobes on their inner surface and within the tube, elsewhere smooth and glabrous, not ciliate, rich blackish-purple or "very deep maroon" (*Marloth*), with the base of the tube and a zone at its middle white or whitish; *tube* 2 lin. long, 2 lin. in diameter at the mouth inside, campanulate or cup-shaped; *lobes* ascending-spreading, 5 to 7 lin. long, $1\frac{3}{4}$ to 2 lin. broad at the base, thence tapering to the acute apex, with reflexed or replicate margins;

Outer corona: somewhat saucer-shaped at the base, with 5 pairs of minute acute teeth about $\frac{1}{4}$ lin. long, with or without 5 other obtuse teeth (formed by the connection with the inner corona-lobes) alternating with them, yellowish, with purple tips to the teeth;

Inner corona: lobes $\frac{1}{2}$ lin. long, oblong or linear-oblong, obtuse, subtruncate or emarginate at the apex, closely incumbent upon the backs of the anthers and shorter to longer than them, but not turned up at the tips, dorsally connected at the base to the very short cup of the outer corona, yellowish, more or less marked with purple-brown on the margins and dorsal projection;

Follicles: very slightly diverging, $5\frac{1}{2}$ to $6\frac{1}{2}$ in. long, $\frac{1}{4}$ in. thick, linear-terete, tapering at the base and into an acute apex, smooth, glabrous.



FIG. 277

Caralluma arenicola N. E. Brown x 1.5

Photo by Herbert Lang.

Type locality: Cape Prov.: Laingsburg Distr.: near Matjesfontein.

Distribution: Also from Prince Albert Distr.: near Prince Albert; Oudtshoorn Distr. without precise locality.

Caralluma arenicola is said by Dr. Marloth to grow nearer to Capetown than any other *Caralluma*, near Saldanha Bay, 65 miles up the coast. Mr. Pillans, however, writes us that he feels confident this record is an error. The known habitat of the species includes stations near Prince Albert and near Matjesfontein, where it was first discovered by Mr. Pillans growing in soft sand that had accumulated under bushes, whence its name of "the Sand-dweller." It is also reported from the Oudtshoorn district by Mr. Luckhoff.

C. arenicola is a plant 3 to 4 inches tall, forming tufts up to 2 feet in diameter, the

erect stems armed with very spreading teeth.

The flowers are a little over an inch in size. They grow in small clusters at the sides of the stems, the corolla minutely papillate inside at the base of the lobes and in the small cup-shaped tube at the centre, otherwise wholly glabrous, colored very deep maroon, with the bottom of the tube and a zone at its middle whitish. The outer corona is bowl-shaped, with five pairs of minute teeth sometimes supplemented by additional alternating teeth, which form dorsal connections to the lobes of the inner corona.

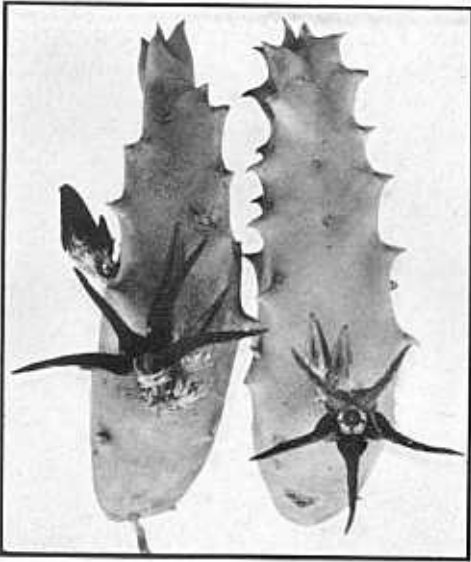


FIG. 278

Caralluma arenicola N. E. Brown x 1.

From the collection of Miss Kathleen Wheeldon, Umtata, Transkei. Photo: G. W. Reynolds, Johannesburg.

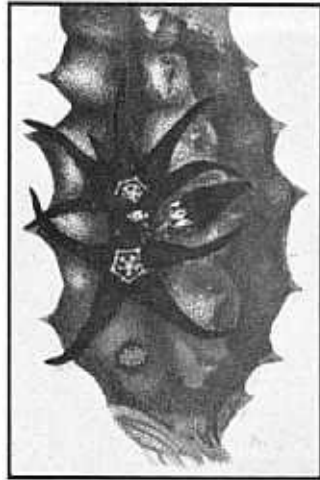


FIG. 279

Caralluma arenicola N. E. Brown x 1

From a drawing by E. Dixie and E. Smith, in R. Marloth: Flora of South Africa, 1932.

92. *Caralluma gossweileri* S. Moore, Journ. Bot., 367. 1912.

(Description summarized from that by Mr. Moore, l.c., translated from the Latin):

Stems: successively branching, spreading, prostrate, about 10 mm. thick when dried, 4-angled, with large triangular teeth 13 mm. long;

Flowers: in lateral or apical clusters of about 7;

Bracts: 3 mm. long, lanceolate, acuminate;

Pedice: about $1\frac{1}{2}$ cm. long;

Sepals: $5\frac{1}{2}$ mm. long, $3\frac{1}{2}$ mm. broad at the base, ovate-lanceolate, acute;

Corolla: about 10 cm. in diameter, dark chocolate on inner face, united portion broadly tubular, 8 mm. broad and 7 mm. deep, rugose; lobes $4\frac{1}{2}$ cm. long, 5 mm. broad at the base, narrowly linear-lanceolate, shiny outside, rugose within;

Outer corona: lobes arising 1 mm. above the base of the staminal column, $2\frac{1}{2}$ mm. long, $1\frac{1}{2}$ mm. broad, shield-shaped, toothed at the upper rim;

Inner corona: lobes $3\frac{1}{2}$ mm. long, far exceeding the staminal column, linear, obtuse, subhorizontal at the base and recurved above, with a prominent dorsal gibbosity forming a connection to the outer corona.

Type locality: Angola: Kubango: near Forte Princeza Amelia.

Distribution: Not otherwise recorded.

"Gossweiler's *Caralluma*" was discovered prior to 1912 by John Gossweiler, growing in thickets on ferruginous rocky ground near Forte Princeza Amelia on the Kubango River in southern Angola. The author compares it with *Caralluma lutea*, from which the flowers differ in being wholly dark chocolate-brown within, with longer corolla-lobes, the corolla being about 4 inches in diameter, with the outer corona-lobes narrower and the inner corona-lobes with a prominent dorsal gibbosity at the base instead of the short erect

dorsal tooth characteristic of *C. lutea*. The parallelism with *C. nebrownii*, from neighboring South West Africa, is probably even closer, the principal differences including the prostrate spreading stems of *C. gossweileri*, and the very narrow corolla-lobes of the flowers, only one-third the width of those of *C. nebrownii*. We have grouped the plant among the species with corolla-lobes not ciliate, for there is no mention of ciliation in the description. It is possible, however, that this was an oversight, in which case our classification is in error.

93. *Caralluma huillensis* Hiern, Cat. Afr. Pl. Welw., i. 697. 1898.

(Description by Dr. N. E. Brown, Flora Trop. Afr., iv. i. 487):

Plant: broadly tufted; *stems* ascending, 2 to 3 in. long, thick, club-shaped, 4-angled, softly, but obsoletely pubescent; angles with stout teeth, straight or slightly decurved at the tips;

Flowers: in clusters of 6 to 10 at or near the apex of the stems;

Pedicel: $\frac{2}{3}$ to 1 in. long, rather stout, glabrous;

Bracts: about 2 lin. long, lanceolate-subulate, glabrous;

Sepals: rather more than $\frac{1}{4}$ in. long, lanceolate-subulate, glabrous;

Corolla: dusky red, thinly or obsoletely pubescent outside, nearly glabrous and rugulose on the inner face, deeply 5-lobed; *tube* about $\frac{1}{3}$ in. long, sub-hemispherical; *lobes* $1\frac{1}{4}$ to $1\frac{1}{2}$ in. long in their dried state, lanceolate-linear;

Outer corona: lobes short, very obtuse, excised, revolute;

Inner corona: lobes about $\frac{1}{6}$ lin. long, stoutly subulate.

Type locality: Angola: Huilla.

Distribution: Not further known.

Caralluma huillensis derives its name from Huilla in southern Angola, where it was collected by Dr. Welwitsch about 1860. It is known only from the material in his herbarium and has never been in cultivation.

The 3 to 4-inch flowers, dusky red

with deeply cleft corolla-lobes, grow in terminal clusters of 6 to 10. The stems are described as softly but obsoletely pubescent. Pubescent stems are a rare character in the *Carallumas*, being mentioned in the description of *C. torta*, but occurring so far as we know in no other species.

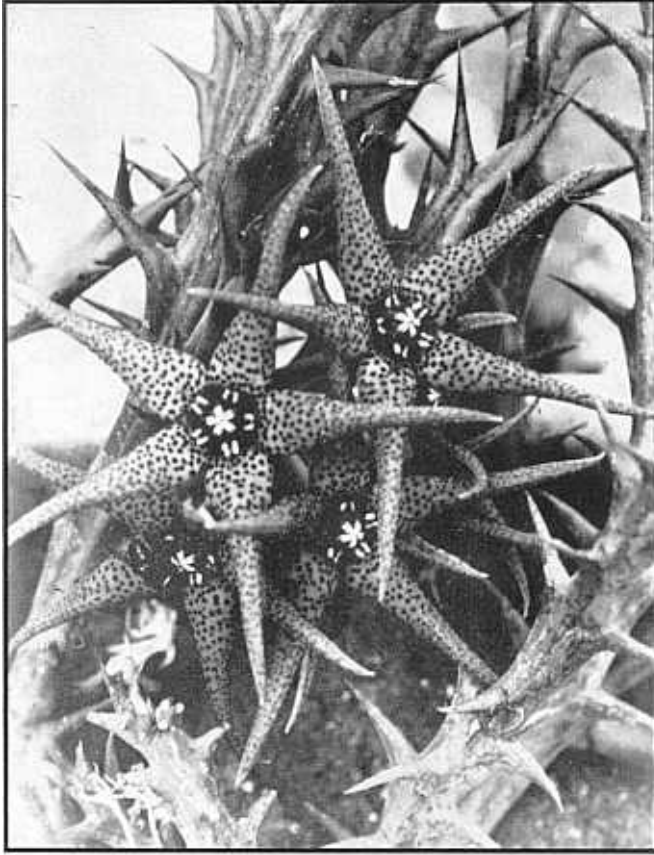


FIG. 280

Caralluma caudata N. E. Brown x 1.25

Photo by E. B. W. Schoenfelder.

94. *Caralluma caudata* N. E. Brown, Flora Trop. Afr., iv. i. 485. 1904.

(Description by Dr. Brown, l.c.):

Stems: (only one piece seen, 3 in. long, $\frac{1}{4}$ in. thick excluding the teeth), erect, glabrous, 4-angled; angles rounded, toothed; teeth about 5 lin. long, rather distant, straight, spine-like;

Flowers: several, in sessile umbel-like fascicles near the base of the young stems;

Bracts: very small, about 1 lin. long, acute;

Pedicel: $\frac{3}{4}$ in. long, 1 lin. thick, glabrous, erect;

Sepals: 3 lin. long, $\frac{2}{3}$ to $\frac{3}{4}$ lin. broad, lanceolate, acuminate, glabrous;

Corolla: in bud $1\frac{1}{2}$ in. long, pentagonal, tapering into a long acuminate slightly twisted point; very deeply 5-lobed when expanded, yellow, mottled with purple; united part $2\frac{1}{2}$ to 3 lin. long, somewhat saucer-shaped, minutely papillate within; lobes $1\frac{1}{4}$ to $1\frac{1}{2}$ in. long, $3\frac{1}{2}$ lin. broad at the ovate base, thence gradually tapering into long narrow tails, spreading, glabrous on both sides, sparingly ciliate with long vibratile clavate purple hairs;

Outer corona: lobes $\frac{3}{4}$ lin. long, shortly united at the base, spreading, subquadrate, bifid, with short divergent teeth at the apex, or sometimes nearly truncate, with the teeth horizontally spreading and somewhat resembling the letter T;

Inner corona: lobes $\frac{3}{4}$ to 1 lin. long, linear, obtuse, incumbent on the backs of the anthers and not exceeding them, adnate at the base to the outer corona.

Type locality: Nyasaland: Namasi.

Distribution: Reported from widely separated localities, some of which may belong to the varieties: Southern Rhodesia: without precise locality; South West Africa: Okavango.

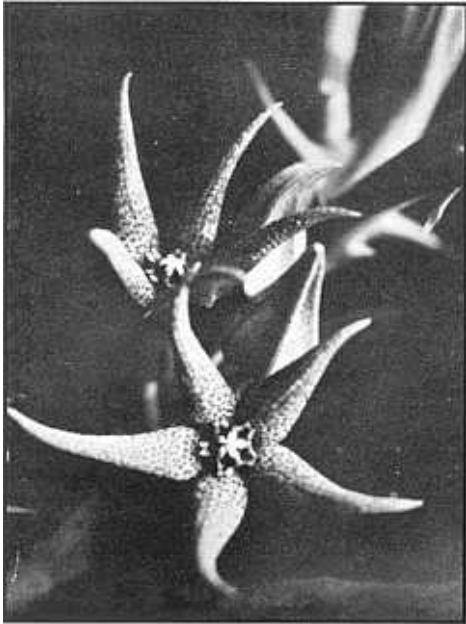


FIG 281. *C. caudata* N. E. Brown x
Photo B. W. Schoenfelder.

The "tail-bearing *Caralluma*" was first collected in Nyasaland by K. J. Cameron of the African Lakes Corporation, who about 1894 sent specimens of a number of tropical plants from the Company's Gardens at Mandala to the Royal Botanic Gardens at Kew. The species derives its name from the tail-like tips of the corolla-lobes, which twist into rather fantastic shapes as the flowers age. It has until recently been little known and frequently confused with *Caralluma maculata*. This has perhaps occurred because the name, "spotted *Caralluma*," would fit *C. caudata* so perfectly in the type and in the var. *chibensis*. There is no cause for confusion, however. The stems of *C. maculata* are entirely distinctive, and the corolla-lobes not at all tail-like. More important, technically, is the fact that in *C. maculata* the corona appears 1-seriate, the portion corresponding to the outer corona being ring-like in outline without

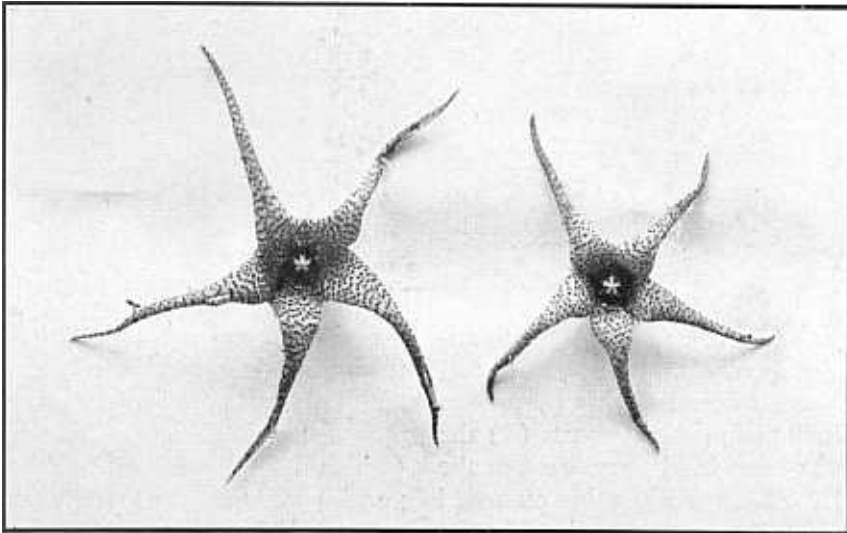


FIG. 282. Two flowers, x 1., of *Caralluma caudata* from Southern Rhodesia. The left-hand flower has the lobes much more elongated, and they are spotted on both inner surface and back. The smaller right hand flower is unspotted on back. Photo by L. S. A. Vereker.

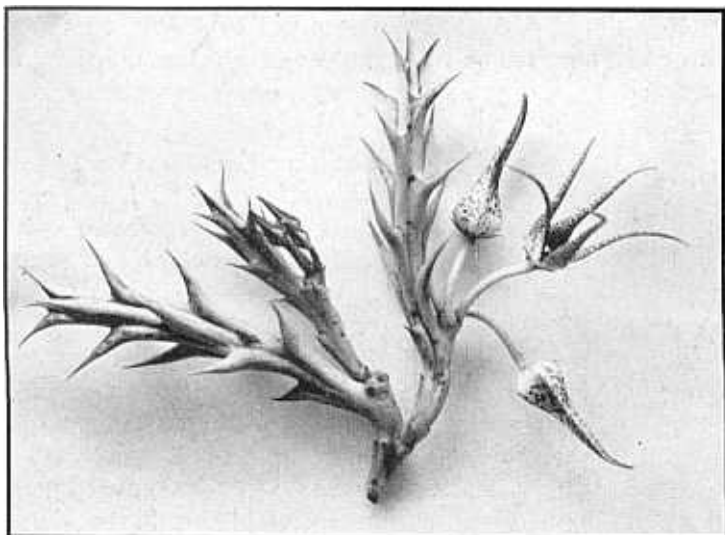


FIG. 283

Caralluma caudata N. E.
Brown

Stems of the plant which bore
the flower shown at left in Fig.
282. Photo by L. S. A. Vereker.

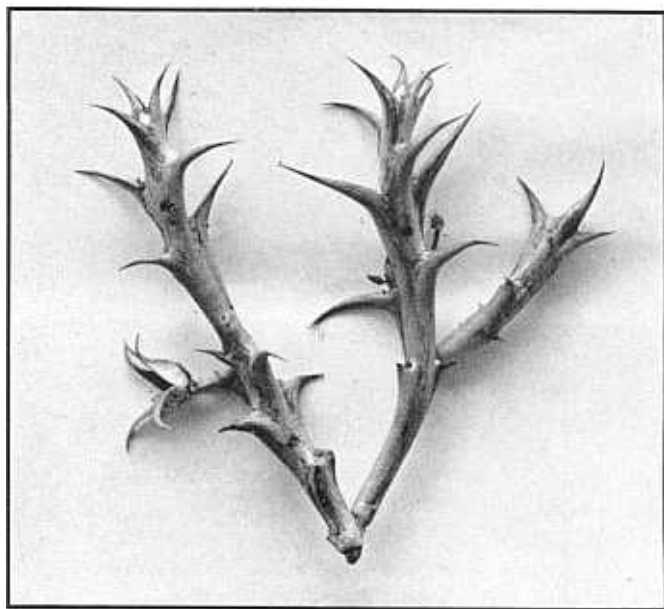


FIG. 284

Caralluma caudata N. E. Brown

Stems of the plant which bore the
flower shown at right in Fig. 282.

Photo by L. S. A. Vereker.

distinct lobes. In *C. caudata* and its varieties, on the contrary, the outer corona-lobes are very distinct and very variable in shape. Three main designs occur: (1) the outer corona-lobes bifid or notched at the apex; (2) the lobes truncate, but extended horizontally at the apex somewhat like the letter T; and (3) the lobes truncate, but not extended horizontally, nor in any degree notched or bifid. The type presents

both the first and second designs in different plants, but the second is certainly very rare and perhaps limited to the original specimen from Nyasaland. The var. *fusca* (which has the corolla uniformly dark purple) exhibits exclusively the second coronal design, and the var. *chibensis* the third.

The "Chibi variety" closely parallels the type in having the entire corolla spotted,



FIG. 285

Caralluma caudata var. *chibensis* Luckhoff x 1.4

Photo by Carl Luckhoff.

8

but the color of the spots is crimson rather than purple. The flowers are smaller and the inner face of the corolla is pubescent with white hairs. Mr. Luckhoff first published this variety as a separate species and it would probably deserve to retain specific rank were not the coronas of the entire group so nearly interrelated.

Besides the two varieties of *C. caudata* there is a variable intermediate form, with the corolla uniformly dark purple on the united portion and to a varying degree on the basal third of the lobes, the remainder of the lobes spotted as in the type.

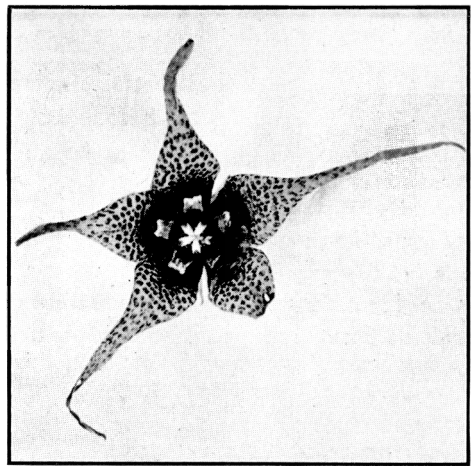


FIG. 286

Caralluma caudata N. E. Brown x 1.25

Var. a. *Caralluma caudata* var. *fusca* Luckhoff, var. nov.

(Description by C. Luckhoff) :

Corolla: uniformly dark purple to the tips of the lobes;

Corona: as in the type, the outer corona-lobes bifid.

Otherwise as in the type.

Type locality: Unknown.

Distribution: Unknown.

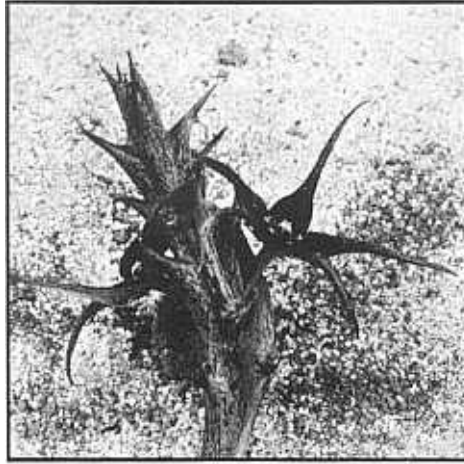


FIG. 287

Caralluma caudata var. *fusca* Luckhoff x 1.

Photo by Carl Luckhoff.

Var. b. *Caralluma caudata* var. *chibensis* (Luckhoff) Luckhoff, comb. nov.

Caralluma chibensis Luckhoff, So. Afr. Gard., 56. 1935.

(Description by C. Luckhoff, l.c.):

Plant: glabrous, forming compact clumps up to 15 to 20 cm. across; *stems* erect or spreading, branching from the base, 5 to 8 cm. long, 7 to 8 mm. thick excluding the teeth, 4-angled; angles obtuse, with spreading very acute compressed teeth 1 to 1.5 cm. long, grey-green mottled with purple;

Flowers: solitary;

*Pedice*l: 5 to 7 mm. long;

Sepals: 4 mm. long, with narrow attenuate tips;

Corolla: 5.5 cm. in diameter, lobed nearly to the base, the united portion in the form of a shallow cup; inner face canary-yellow, dotted with small distinct crimson spots, pubescent with minute white hairs; *lobes* 2.2 cm. long, 7.5 mm. wide at the base, thence tapering to the apex, with the edges of the apical half recurved, ciliate near the base with vibratile clavate purple hairs;

Outer corona: shortly cupular at the base; lobes about 1.5 mm. long, truncate, crimson, with paler tips;

Inner corona: lobes 2.5 mm. long, acute, incumbent on the anthers and slightly exceeding them, connected with the outer corona, with a small dorsal gibbosity at the base, crimson.

Type locality: Southern Rhodesia: Chibi, near Fort Victoria.

Distribution: Not further known.

Discovered in 1931 by Miss Jackson, now Mrs. P. Kruger of Wellington.

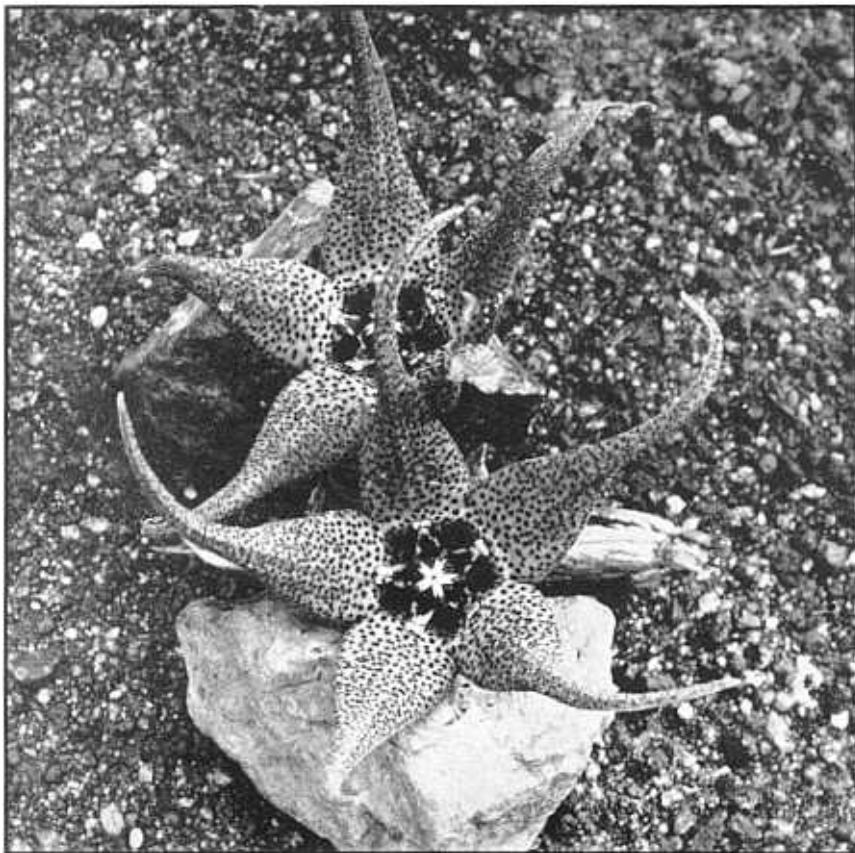


FIG. 288

Caralluma caudata var. *chibensis* Luckhoff x 2.

Photo by Carl Luckhoff.

Further notes on *C. caudata* will be found in the Addenda.

95. *Caralluma melanantha* (Schlechter) N. E. Brown, Flora Cap., iv. i. 885. 1909.*Stapelia melanantha* Schlechter, Engler: Jahrb., xxxviii. 50. 1905.*Stapelia furcata* N. E. Brown, Flora Cap., iv. i. 973. 1909.*Caralluma leendertziae* N. E. Brown, Ann. Transv. Mus., ii. 47. 1909.? *Caralluma rubiginosa* Werdermann, Fedde: Repertorium, xxx. 52. 1932.

(Description by Dr. Brown, Ann. Transv. Mus., l.c., translated from the Latin) :

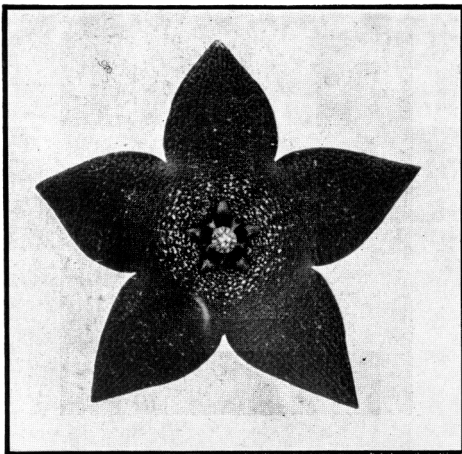
Stems: 8 to 10 cm. high, 1½ to 2 cm. thick excluding the teeth, 4-angled, strongly toothed, glabrous; teeth 6 to 10 mm. long, large, acute, with a small denticle on either side near the apex;*Peduncle*: from the middle of the stems, 1 to 1½ cm. long, 5 to 8 mm. thick, glabrous, producing an umbel of 3 to 5 flowers;*Pedicel*: 4 to 4½ cm. long, 3½ mm. thick, erect, glabrous;*Sepals*: 9 mm. long, 3½ mm. broad, ovate-lanceolate, long acuminate, glabrous;*Corolla*: 5 cm. in diameter, rotate, without a tube, outside smooth, glabrous, inside densely rugulose and with scattered minute erect hairs, deep purple-black, ciliate to the tips of the lobes with long vibratile clavate purple hairs; *disk* flat; *lobes* 16 to 18 mm. long, 13 to 14 mm. broad, spreading, flat, deltoid-ovate, acute;*Outer corona*: 5-lobed, glabrous, brownish-purple; lobes spreading, 4 mm. long, 3 mm. broad, flat, subquadrate at the base, lightly 2-keeled above, 3-toothed at the apex, the middle tooth ovate, acute, subsinuate on the margins, the lateral teeth spreading, acute;*Inner corona*: lobes 4 mm. long, twice as long as the anthers, connivent, laterally compressed, 2-toothed at the apex, adnate at the base to the outer corona, concave emarginate, glabrous, dark purple.*Type locality*: Transvaal: Pietersburg Distr.: stony flats near Sandloop, 5,000 ft. elevation.*Distribution*: Transvaal: Middelburg Distr.: Selon's River Valley, 22 miles north of Middelburg; Lydenburg Distr.: Sekukuniland; Waterberg Distr.: Buffelspoort; Nylstroom; Pietersburg Distr.: "most common local *Stapeliad*;" Potgietersrust Distr.: Zebediela Estates; and other points; Zoutpansberg Distr.; Southern Rhodesia: Bulawayo Distr.

FIG. 289

Caralluma melanantha N. E. Brown x 1.

From Selon's River Valley, Middelburg District.

Photo: G. W. Reynolds, Johannesburg, of a form with yellow spots on the disk.

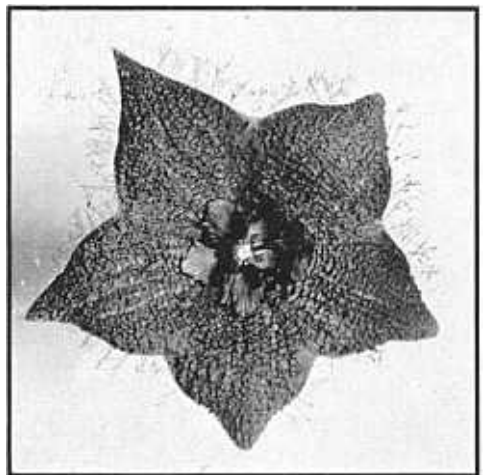


FIG. 290

Caralluma melanantha N. E. Brown x 1.2

The "black-flowered *Caralluma*" was discovered in 1894 by Dr. R. Schlechter near Sandloop in the northern Transvaal. He assigned it to the genus *Stapelia*, doubtless because the outer corona appears divided into free lobes far down towards the base. But near their base the lobes are intergrown, and the inner corona-lobes are dorsally adnate to them, characters which caused Dr. N. E. Brown to transfer the species to *Caralluma* in the *Flora Capensis*. The distribution of *C. melanantha* extends from Bulawayo in Southern Rhodesia to well below the tropic in the Transvaal and Portuguese East Africa (var. *sousae*). At some points in its range it is very plentiful, notably in the tropical districts of the Transvaal.

"The plant stems of *C. melanantha*," J. F. Kirsten Pietersburg writes us, "tend to become squat and bloated with age. In young stems, the rudimentary cross-section is sometimes almost in the shape of a Maltese cross. The denticles at the base of the teeth are then very prominent. By the end of the first season, the stems have become somewhat coarser, and during the second season the angles swell out, the stems become more cylindrical, and the denticles are little more than scars." The flowers have a handsome purple-black corolla, densely rugose on the inner face and sprinkled with short hairs, the lobes fringed to the tips with long vibratile clavate purple hairs. Occasionally a reddish corolla will be found, or one with yellowish spots. The corolla-lobes are



FIG. 291

Caralluma melanantha N. E. Brown x 0.6

nearly deltoid and have none of the slender appearance of those of *C. lutea* and its allies. The details of the flowers are very variable and Miss I. C. Verdoorn has said of them: "Not only does the color vary in the many specimens I have seen, but also the size of individual flowers and the presence or absence of hairs on the corolla surface. The corona is also variable, especially the formation of the inner corona-lobes. However, these modifications are probably but forms, for *C. melanantha* is always an easily recognized species, very character-

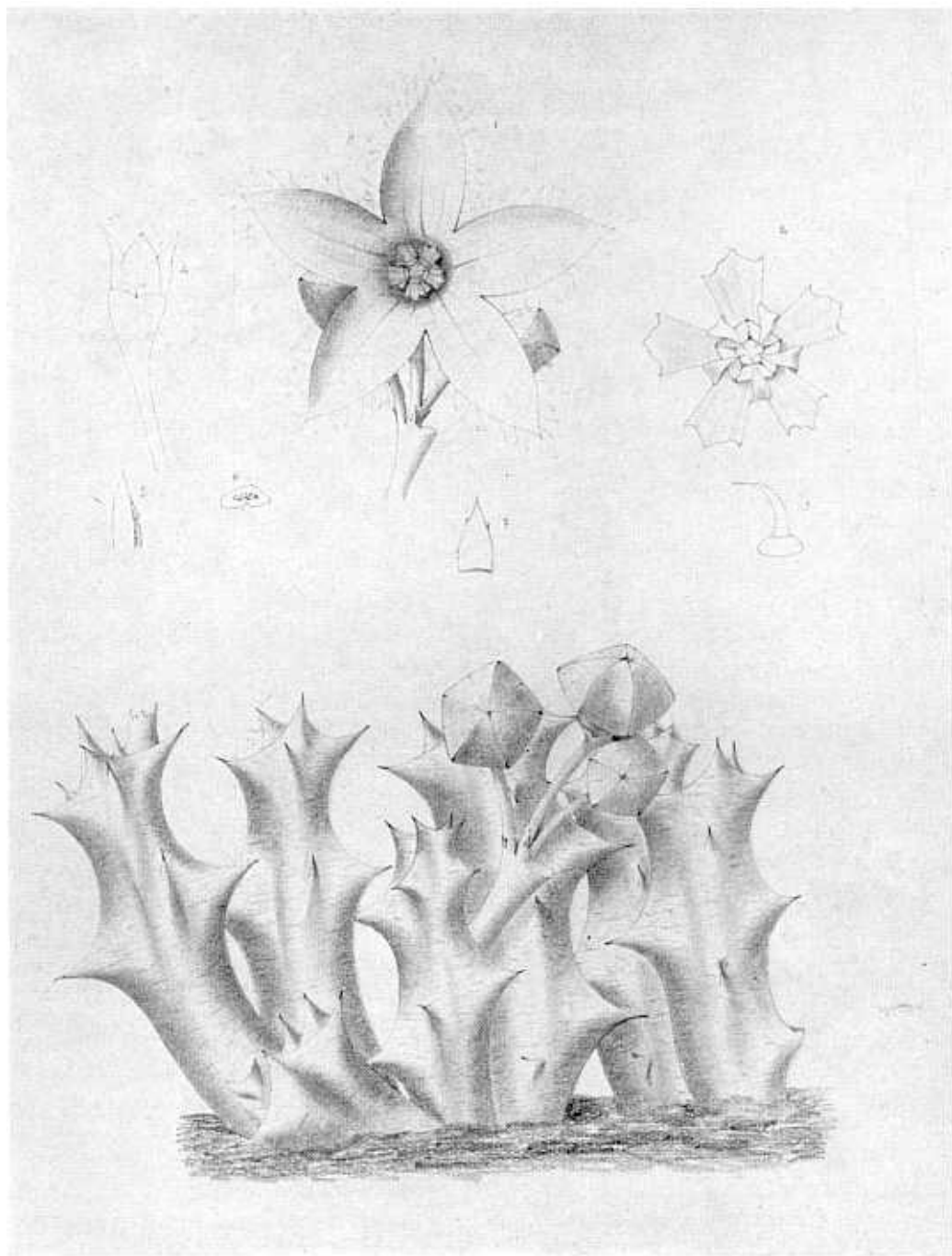


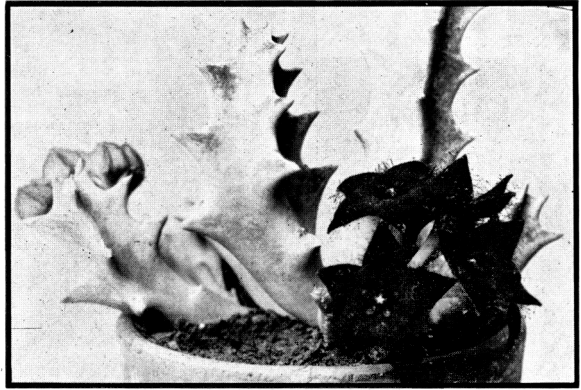
FIG. 292

Caralluma melanantha var. *sousae* x 1.

Drawing by Prof. Antonio de Figueiredo Gomes e Sousa, from a plant growing at Mangulane, Portuguese East Africa.

FIG. 293

Caralluma melanantha N. E. Brown x 0.5
From W. I. Beecroft Gardens. Photo by Havens.



istic in spite of the variation mentioned." Among particular variations reported we note one plant collected by Mr. Kirsten on Pietersburg Town Lands, which has flowers differentiated by the complete absence of hairs from the inner corolla surface; the flowers are very dark and slightly smaller than in the type. Another, from the Zebediela Estates, is characterized by its reddish flowers, the corolla sprinkled inside with short papillose hairs; the inner coronalobes are formed of two short superimposed horns. A third form, collected by Miss A. B. Warren (Smitsdrift), is doubtless the finest embodiment of this interesting species. The flowers are distinguished by the richness of the hairs which cover

the entire inner corolla surface, as well as by the unusual length of the ciliation of the corolla-lobes. The yellow spots on the dark corolla furnish a striking climax. One is tempted to see actual varieties in these and other modifications of *C. melanantha*, but Miss Verdoorn speaks a word of caution until fuller study has been possible: "At present," she writes, "I feel doubtful about all these forms. It is just possible that plants which exactly fit these descriptions will never come in again; or we may even find that variations like these will occur between flowers on a single plant. Then again it may eventually transpire that there are two or more distinct species and their hybrids."

Var. a. *Caralluma melanantha* var. *sousae* Gomes e Sousa, Moçambique, No. 4, 46. 1935.

(Description by Prof. Antonio de Figueiredo Gomes e Sousa, translated from the Portuguese) :

Flowers: 3 together, from a common peduncle, which is often scarred by the breaking off of former pedicels;

Pedicel: 2 cm. long, 3 mm. thick, greenish;

Sepals: greenish, roseate at the base, 6 mm. long, 3 mm. broad, triangular, slightly concave;

Corolla: very dark purple-red, nearly lilac at centre; 5 cm. in diameter; inner face rugose, covered with papillose black hairs less than 2 mm. long; *lobes* 18 mm. long, 12 mm. broad, ciliate with clavate dark purplish hairs 2mm. long;

Outer corona: lobes 5 mm. long, 3 mm. broad, 3-toothed, middle tooth ovate, subsinuate, lateral teeth spreading, acute; dark purple-red;

Inner corona: lobes 3 mm. long, 3 mm. broad at the base, slender, connivent over the anthers; dark purple-red.

Type locality: Portuguese East Africa: growing in shade on sandy soil at 150 feet elevation, near Mangulane.

Distribution: Not further known.

"Sousa's variety" differs from the type in the greater indentation and more slender shape of the corolla-lobes and in its distinctive inner corona-lobes. The latter are devoid of any of the secondary horns, crested wings or teeth, which decorate the inner corona-lobes in all the other forms of this versatile species. They arise, as in the type, from between the outer corona-lobes, to which they are adnate; but they are formed of a single acute flat point, which is folded inwards and is thus incumbent over the anthers.

This variety was discovered in November, 1934, by Prof. Gomes e Sousa, of the Department of Agriculture of Portuguese East Africa.

FIG. 294

Prof. Antonio de Figueiredo Gomes e Sousa.



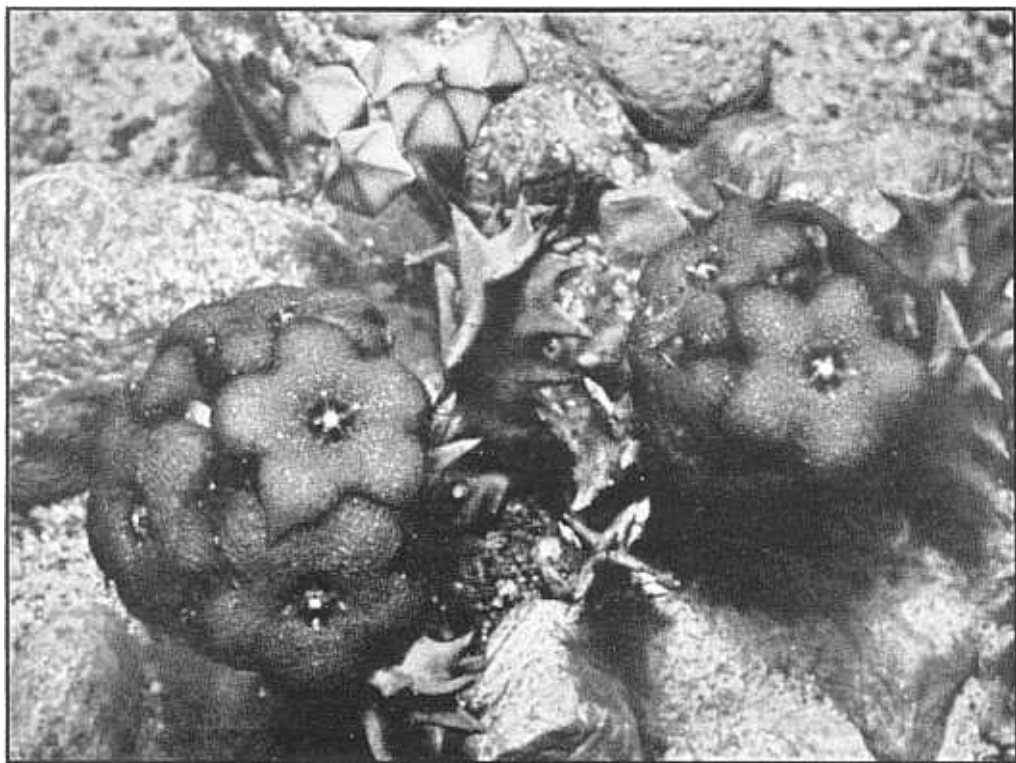


FIG. 295

Caralluma melanantha (f. *rubiginosa*)

From a natural color photograph by Prof. Dr. Werdermann in *Blühende Kakteen und andere sukkulente Pflanzen*, April, 1932.

We have included in the synonymy of *C. melanantha* the name of *C. rubiginosa*, applied by Dr. E. Werdermann to a plant of unknown origin cultivated since 1930 in the Berlin-Dahlem Botanical Gardens. Dr. Werdermann's plant differs, however, in many respects from the type of *C. melanantha*, as originally limited by Schlechter. The flower umbels in Schlechter's description are said to be sessile, those of *C. rubiginosa* are pedunculate, as they are in most

forms of this polymorphic species; the color of the corolla in *C. rubiginosa* is rusty red, the parts vary materially in size and the inner corona-lobes are less deeply intergrown. When more complete collections of *C. melanantha* permit the species eventually to be subdivided, Dr. Werdermann's "rusty" form will point the direction in which one of its subdivisions will probably be erected. For the inclusion of *Stapelia furcata* in the synonymy, see p. 474.

96. *Caralluma lutea* N. E. Brown, Icon. Pl., t. 1901. 1890.

(Description by Dr. N. E. Brown, Flora Cap., iv. i. 885):

Stems: crowded, $1\frac{1}{2}$ to 4 in. long, sharply 4-angled, $\frac{1}{2}$ to $\frac{3}{4}$ in. thick excluding the teeth, glabrous, green, mottled with dull purple; teeth $\frac{1}{4}$ to $\frac{1}{3}$ in. long, stout, acute, horizontal;*Flowers*: 3 to 26 in a cluster at the middle or lower part of the young stems, mostly opening at the same time;*Pedicel*: $\frac{1}{2}$ to 1 in. long, stout, glabrous;*Sepals*: $2\frac{1}{2}$ to 4 lin. long, lanceolate or ovate-lanceolate, acuminate;*Corolla*: $1\frac{1}{2}$ to $2\frac{1}{2}$ in. in diameter, glabrous outside, rugulose within, yellow; *tube* or united part 3 to 4 lin. long; *lobes* spreading, $\frac{3}{4}$ to $1\frac{1}{3}$ in. long, $\frac{1}{4}$ to $\frac{1}{3}$ in. broad, narrowly lanceolate, attenuate to an acute point, ciliate with vibratile clavate purple hairs;*Outer corona*: cup-shaped with a recurved margin, consisting of 5 subquadrate contiguous lobes $\frac{3}{4}$ lin. long, 1 lin. broad, minutely toothed at the subtruncate apex and with several slight keels on the inner face, yellow;*Inner corona*: lobes 1 lin. long, filiform, connivent-erect, dorsally connected with the sinuses of the outer corona at their base, where there is a short erect subulate tooth, yellow.

Type locality: Transvaal: without precise locality.

Distribution: Transvaal: Bloemhof Distr.: Kameelpan; Christiana; Johannesburg Distr.: very plentiful 25 miles north-west of Johannesburg; Krugersdorp Distr.; Lydenburg Distr.: Sekukuni-land; Punda Maria; Marico Distr.: Zee-rust; Pietersburg Distr.: Pietersburg; Letaba; Pretoria Distr.: common on hills around Pretoria; Rustenburg Distr.: Zwarttruggens; Waterberg Distr.: Na-boomspruit;

Cape Prov.: Hopetown Distr.: Hope-town; Strydenburg; Prieska Distr.; Griqualand West: Hay Distr.: Postmas-burg; Herbert Distr.: Douglas; Mazels-fontein; Kimberley Distr.: plentiful; Barkly West Distr.: Warrenton; Four-teen Streams; Bechuanaland: Mafeking; Vryburg.

Orange Free State: Fauresmith Distr.: kopjes on Veld Reserve; Philippolis Distr.: Luckhoff;

Bechuanaland Protectorate: Lobatsi; Kalahari Desert;

Natal: plentiful, especially in the Um-laas River Valley west of Camperdown;

? Portuguese East Africa: near Lou-renço Marques; near Rovuma.

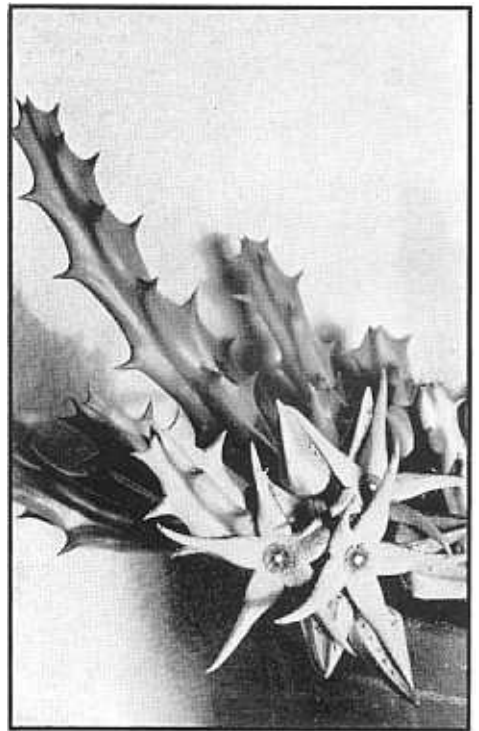


FIG. 296

Caralluma lutea N. E. Brown x 0.5

The "yellow *Caralluma*" is a very widely distributed species, as evidenced by the foregoing partial record of its habitats. Its discovery is attributed to John Sanderson of Durban, who collected it in the "Trans-



FIG. 297

Caralluma lutea N. E. Brown

From Umlaas River Valley, Natal. Photo: G. W. Reynolds, Johannesburg.

vaal country" prior to 1854. The beautiful canary-yellow flowers, although handicapped by an abominable odor of stale fish, have attracted the notice of many travelers. Mrs. Barber wrote of its abundance near Kimberley: "It is the commonest of all the family up here, and occurs upon nearly every grassy ridge upon the flats, varying very much in appearance, and, although I have passed over acres of it, I have never yet met with a seed-pod; the plant blossoms profusely in autumn, producing large bunches of flowers, sometimes as many as 16 or 17 in a bunch, and yet I have found no seed upon it." Mrs. Barber's

comment on the reluctance of the plant to set fruit must not be taken too seriously, as her own drawing at Kew shows an outline of the seed-pods, which are represented as about $3\frac{1}{2}$ inches long and moderately stout. The stems are up to 4 inches tall, finely mottled with dull purple, the acute teeth at rather long intervals. The beautiful yellow flowers are vividly set off by the vibratile clavate purple hairs along the margins of the slender corolla-lobes. "I know of several different forms of this species," says Dr. Schweickerdt, "one with relatively short petals, one with sessile coronas, and again a form in which the



FIG. 298

Caralluma lutea N. E. Brown x 0.5

In natural surroundings on open exposed gravel veld near Douglas. Photo: G. W. Reynolds, Johannesburg.

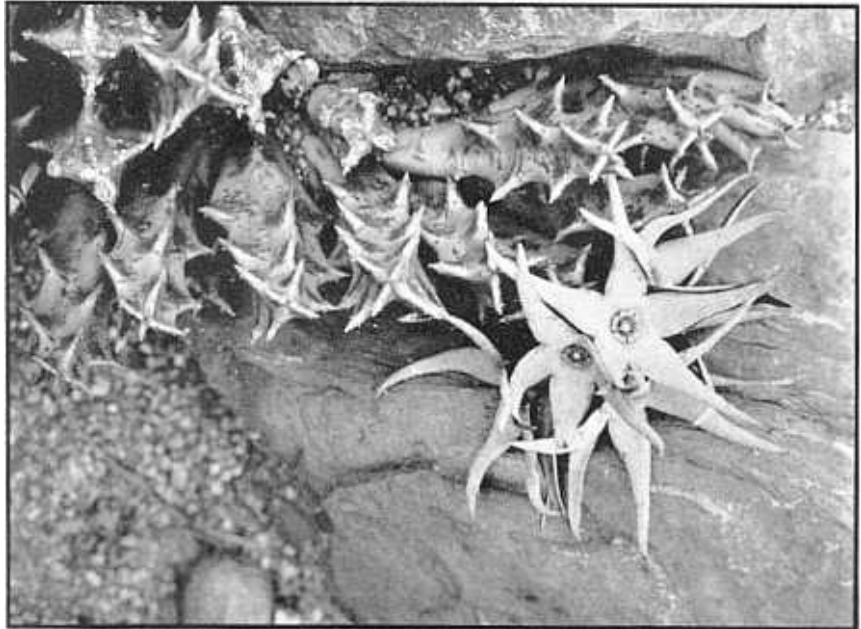


FIG. 299

Caralluma lutea N. E. Brown x 1.

From the dolomite country near Johannesburg. Photo: G. W. Reynolds, Johannesburg.

corona is distinctly raised and stalked." And G. W. Reynolds writes us: "The outer corona is very variable, sometimes divided into 5 finely toothed lobes with about 2 mm. between lobe edges, while in others this division is hardly noticeable, making it appear almost as an unbroken circle." The inner corona-lobes are connivent-erect and dorsally connected with the sinuses of the outer corona by a short erect tooth at their base.

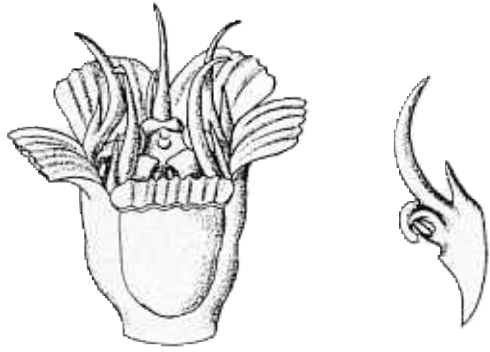


FIG. 300

Corona and an inner corona-lobe of *Caralluma lutea* N. E. Brown

From a drawing by Miss Cythna Letty in the Flowering Plants of South Africa, 1930.

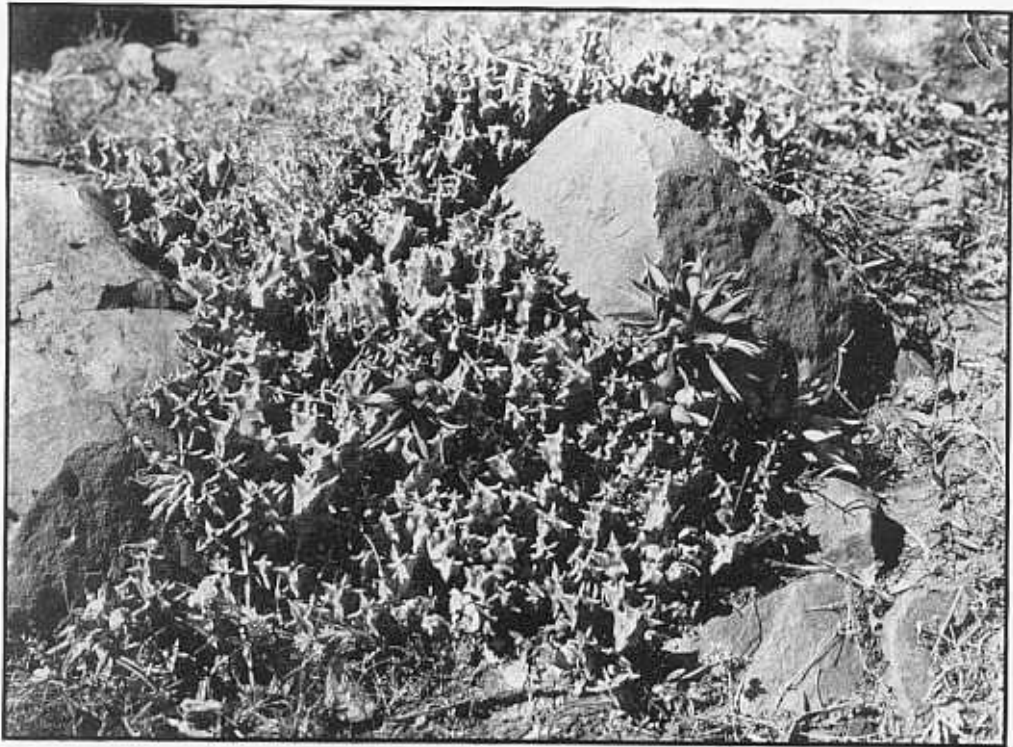


FIG. 301

Caralluma lutea N. E. Brown

In natural surroundings on the banks of the Vaal River near Kimberley.
Photo by A. M. Duggan-Cronin.

97. *Caralluma vansonii* Bremekamp et Obermeijer, Ann. Transv. Mus., xvi. 429. 1935.

(Description by Dr. C. E. B. Bremekamp and Miss A. A. Obermeijer, l.c., translated from the Latin):

Stems: 8 to 10 cm. high, 1 to 1.2 cm. thick, glabrous, pale green, 4-angled; angles with long acute teeth; teeth 9 to 12 mm. long, slender, with two pellucid denticles near the apex;

Flowers: up to 20 together in dichasial umbels arising at mid-stem from a glabrous peduncle up to 2 cm. long and 0.8 cm. thick (often much shorter);

Bracts and bracteoles: filiform, 5 to 7 mm. long;

Pedicel: 4 cm. long, 3 mm. thick, glabrous;

Sepals: subulate, 10 to 11 mm. long, 2 mm. thick at the base, glabrous;

Corolla: up to 10.5 cm. in diameter, rotate; outside smooth, glabrous, with the tube white and the lobes greenish; inside densely rugulose and with inconspicuous longitudinal grooves, lemon yellow, somewhat puberulous; *lobes* triangular, very spreading, 5 cm. long and 1 cm. broad; with slightly recurved margins and subulate tips, ciliate with vibratile clavate purple hairs;

Outer corona: campanulate, with 5 separate quadrate lobes, 5 mm. long and 4 mm. broad, irregularly toothed on the upper margin, with 5 red keels lengthwise on the inner face, otherwise pale brown;

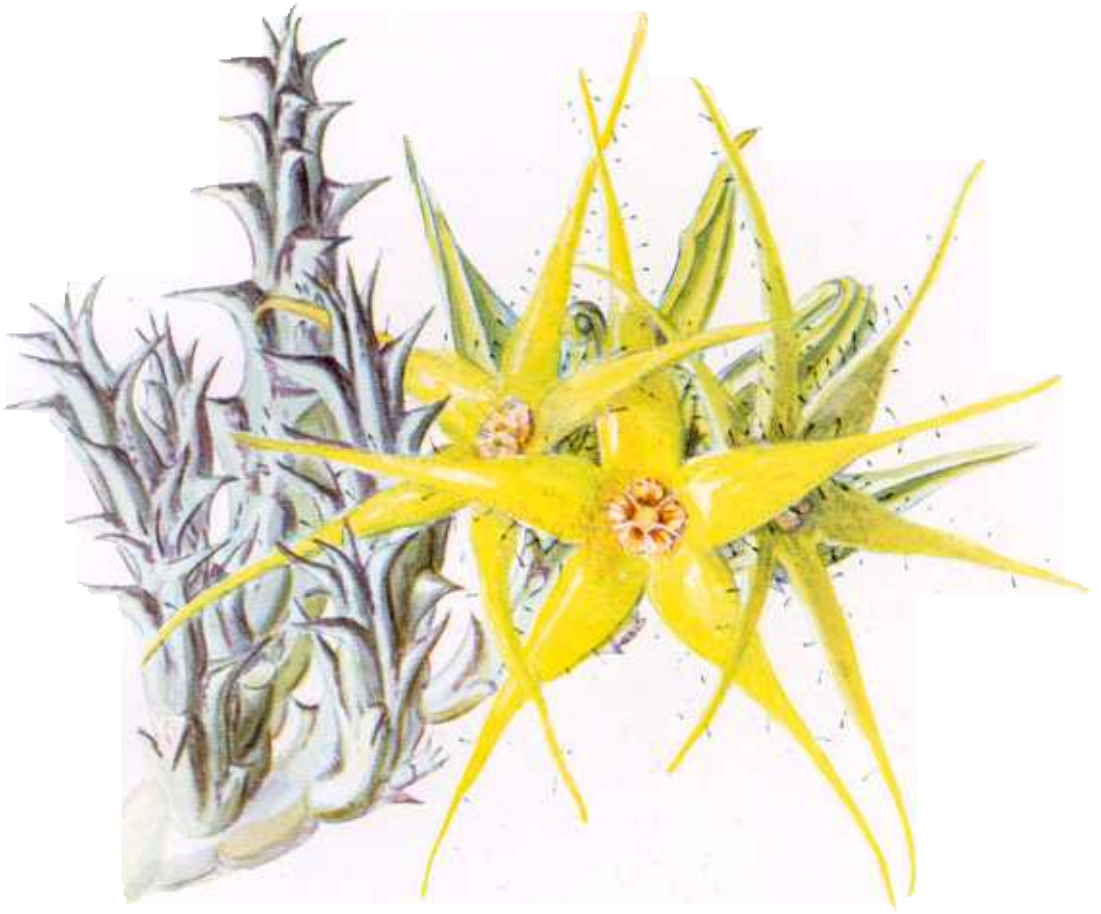
Inner corona: lobes adnate to the tube of the outer corona, 4 mm. long, glabrous, pale brown, laterally compressed, 2-horned, with the horns one above the other; lower horn short, erect; upper horn three times as long, recurved.



FIG. 302

Caralluma vansonii Bremekamp et Obermeijer x 0.8

Photo by Herbert Lang of the type plant from Nkate, Nata River.



Cythna
Letty.

PLATE IV.

In the Flowering Plants of South Africa, for July, 1936, received while this book was in the printer's hands, Dr. E. P. Phillips proposes to unite *Caralluma vansonii* with *C. lutea*, of which he believes it to be a large-flowered form. This figure, from the original water color drawing by Miss Cythna Letty, shows a plant collected by Mr. van Son near the Great Makarikari Salt Pan in the Bechuanaland Protectorate, which flowered at the Union Buildings, Pretoria, in March, 1932.

Type locality: Bechuanaland Protectorate: Kalahari Desert: near Nkate on the Nata River.

Distribution: Not further recorded.

"Van Son's *Caralluma*" is named for its discoverer, G. van Son, who collected it in August, 1930, on the Vernay-Lang expedition across the Kalahari Desert in the Bechuanaland Protectorate. Its habitat is in very poor sandy soil among typical weed-vegetation on sloping ground near Nkate, northeast of the Great Makarikari Salt Pan, near the boundary of Southern Rhodesia, 100 miles due west of Bulawayo. The plant has

pale green stems with acute teeth, noticeably different from the sturdier stems of its near relative, *Caralluma lutea*. The flowers are of the same yellow color, but much larger, with the corolla-lobes relatively narrower; the corona is closely parallel to that of *C. lutea*, with similar crowded little ridges or keels running lengthwise down the middle of the outer corona-lobes.



FIG. 303

Caralluma vansonii Bremekamp et Obermeijer
Photo by Herbert Lang.

98. *Caralluma knobelii* (Phillips) Phillips, Flow. Pl. So. Afr., t. 593. 1935.*Stapelia knobelii* Phillips, Flow. Pl. So. Afr., t. 363. 1930.

(Description by Dr. E. P. Phillips, Flow. Pl., 1935, l.c.):

Stems: spreading, up to 10 cm. long, about 2 cm. broad including the teeth, sharply 4-angled, glabrous; teeth 6 mm. long, stout, conical, acute, almost horizontal;*Flowers*: 10, clustered at the middle of the young stems, opening in rapid succession so that the greater number are open at the same time;*Pedicel*: 1 cm. long, glabrous;*Sepals*: 5 mm. long, ovate-lanceolate, acuminate;*Corolla*: 3.5 cm. in diameter, white on the disk and base of lobes, green in apical third, clearly spotted and blotched with blackish-purple; *tube* shallow, pentagonal, 1 cm. in diameter; *lobes* 1.3 cm. long, 1 cm. broad at the base, ovate, ciliate with vibratile clavate hairs, becoming reflexed in old flowers;*Outer corona*: pentagonally basin-shaped, 8 mm. in diameter; lobes 3 mm. long, 2.5 mm. wide, more or less quadrate, minutely toothed on the subtruncate apex, with a broad grooved dark band from apex to base on the inner face;*Inner corona*: lobes 4 mm. long, filiform, connivent-erect, dorsally connected with the sinuses of the outer corona-lobes, with a distinct basal horn 1.5 mm. long.

Type locality: Bechuanaland Protectorate: Kalahari.

Distribution: in the Kalahari, south and west of Molepolole.

A very striking species, named for its discoverer, J. C. Knobel of Molepolole, who collected it about 1929 on the south-easterly outskirts of the Kalahari. It is related to *Caralluma lutea* by the corona form, the erect spreading inner corona-lobes being dorsally connected by a distinct secondary horn with the sinuses between the minutely toothed sub-truncate lobes of the bowl-shaped outer corona. The flowers are grouped in small clusters, white to green

inside with irregular blackish-purple markings. Not only is the color scheme so different from that of *C. lutea*, but the shape of the corolla-lobes is relatively much broader. The stems make frequent underground growth, coming to the surface a little distance from the parent plant, where they make new plants. This peculiarity is found in other Kalahari plants, such as *C. maculata* and *Duvalia polita*. All these species are usually found growing in sandy conditions, *Caralluma knobelii* exclusively so.

Dr. Phillips first described the species in the Flowering Plants of South Africa, 1930, as a *Stapelia*. In redescribing it in 1935, he wrote: "Since then we have had an opportunity of examining further material grown at the Division of Plant Industry in Pretoria and are now of the opinion that this plant is better placed in the genus *Caralluma*. The chief difference between the two genera is that in *Stapelia* the outer corona-lobes are free, while in *Caralluma* they are partly adnate to the inner corona-lobes. In several species, however, regarded

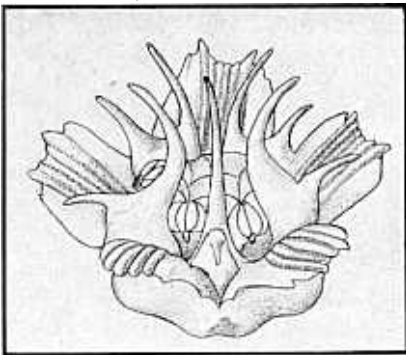


FIG. 304

Corona of *Caralluma knobelii* Phillips
From a drawing by Miss Cythna Letty in the
Flowering Plants of South Africa, 1935.



PLATE. V.

Caralluma knobelii Phillips

From the original water color drawing by Miss Cythna Letty
for the Flowering Plants of South Africa, 1935.

as belonging to the genus *Caralluma*, the connection between the outer and inner corona-lobes is not very apparent. This was the case with the plant we first figured and, for this reason, it was placed in the genus *Stapelia*. We have carefully compared our present plant with the type plant of *Stapelia knobelii* in the National Herbarium and find them to be almost identical. There are,

however, slight differences in the relative lengths of the outer and inner corona-lobes which in our opinion do not warrant keeping the two plants separate as species. Also, in the plant we now figure, the connection between the outer and inner corona-lobes is evident and consequently it is better regarded as a species of *Caralluma*."

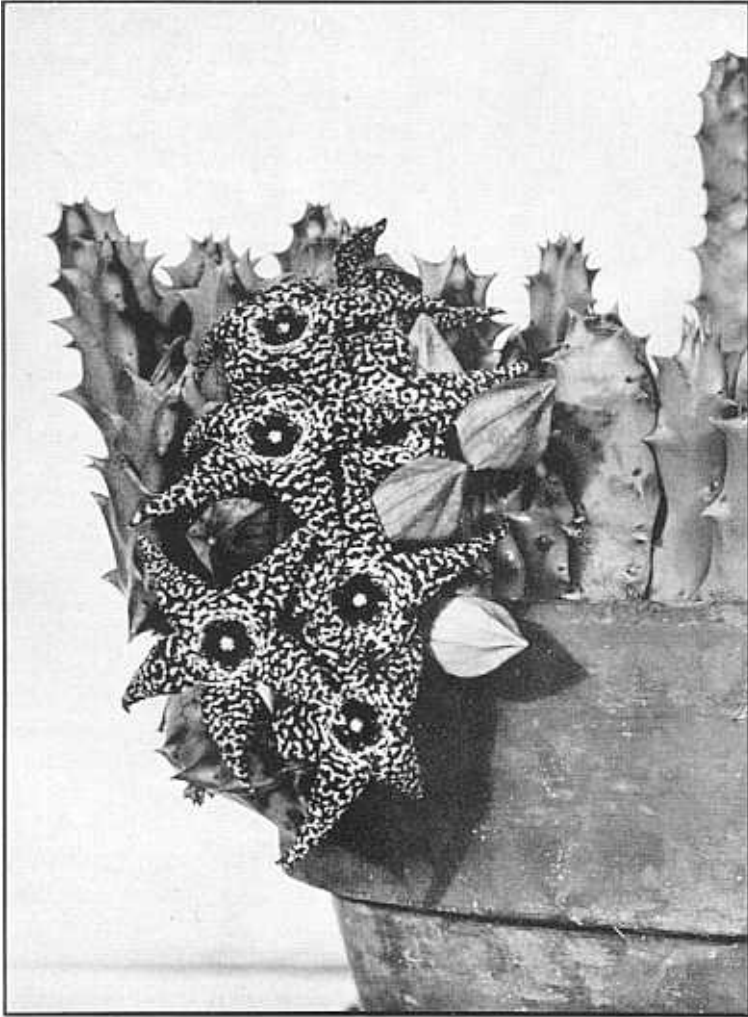


FIG. 305

Caralluma knobelii var. *langii* White et Sloane x 1.

Var. a. *Caralluma knobelii* var. *langii* (White et Sloane), comb. nov.*Caralluma langii* White et Sloane, Stap., 1 Ed., 61. 1933.

(Description by A. White and B. L. Sloane):

Stems: erect or decumbent at the base, 5 to 10 cm. long, obtusely 4 to 6-angled, glabrous, green mottled with purple; teeth shortly conical and acute;*Flowers*: in small clusters of 3 to 8, mostly opening at the same time;*Pedice*l: 3.5 cm. long;*Corolla*: 2.5 to 3.5 cm. in diameter, glabrous, with a shallow depression at the centre containing the corona and horizontally spreading lobes; outside light green, with 3 prominent nerves, inside rugose, pale yellow with irregular purple-brown blotches, the disk and sometimes a strip down the centre of each lobe with fewer markings; lobes ovate-lanceolate with the margins somewhat revolute and the apex becoming recurved in the older flowers, ciliate to the apex with sparse purple-brown vibratile clavate hairs;*Outer corona*: cup-shaped, dividing above into 5 truncately-toothed blackish-purple lobes, with a grooved strip down the centre and the margins dull;*Inner corona*: lobes 4 mm. long, erect-spreading, recurved-hooked at the apex, dorsally connected at the base with the sinuses between the outer corona-lobes by an entire or 2-toothed horn-like process 1.5 mm. long.

Type locality: Bechuanaland Protectorate: near Gaberones.

Distribution: Not further known.



FIG. 306

Caralluma knobelii var. *langii*
White et Sloane x 0.7

In the first edition of this book, we introduced this variety as a distinct species, with the statement that it had been discovered by Herbert Lang in the Bechuanaland Protectorate during the progress of the Verna-Lang Kalahari Expedition in 1930. Mr. Lang has since told us that he was not himself the discoverer of the plant, but that it was collected near Gaberones by G. van Son, entomologist of the expedition. It is pleasant, however, to have the name of

Herbert Lang associated with so handsome a plant, for he has deserved well of the STAPELIEAE by his truly admirable photographs of them.

The plant is so closely related to *Caralluma knobelii* that it has seemed best to unite it to that species as a variety. Yet there are a number of distinctive features, as noted by Dr. E. P. Phillips in the Flowering Plants of South Africa, 1935. The stems are different, at least in green-house

cultivation, much more obtuse in cross-section, sometimes almost round, with smaller teeth; the pedicels are three times as long as in the type, giving the flower clusters a more scattering appearance; the buds are long and pointed, with a diminutive spur at the sinuses between the corolla-lobes; the lobes of the expanded flowers are relatively longer in proportion to their breadth; and the ground color of the whole corolla is yellower, with the markings generally lighter in tone. The corona is nearly identical with that of the type, save that the inner corona-lobes are sharply recurved-hooked at the apex.



FIG. 307

Caralluma knobelii var. *langii* White et
Sloane x 1.25

99. *Caralluma lateritia* N. E. Brown, Flora Trop. Afr., iv. i. 486. 1904.

(Description by Dr. Brown, l.c.):

Stems: not seen, "grows to 9 in. high" (*Lugard*);

*Pedice*l: about $\frac{3}{4}$ in. long, about $1\frac{1}{3}$ lin. thick, glabrous;

Sepals: $2\frac{1}{2}$ to 3 lin. long, $\frac{3}{4}$ to 1 lin. broad, lanceolate, acuminate, glabrous;

Corolla: 3 to $3\frac{1}{2}$ in. in diameter, rotate, very deeply 5-lobed, glabrous on both sides, finely papillate-rugulose on the inner face, ciliate with long vibratile clavate purple hairs to the tips of the lobes, "brick red" (*Lugard*); lobes $1\frac{1}{2}$ in. long, 5 lin. broad at the base, thence gradually tapering to an acute apex;

Outer corona: lobes with their margins slightly adnate at the base to the base of the inner corona-lobes, $1\frac{1}{3}$ to $1\frac{1}{2}$ lin. long, $1\frac{2}{3}$ lin. broad, cuneately subquadrate, irregularly denticulate at the subtruncate recurved apex, and with 5 closely placed ridges or keels on the middle of the upper side, glabrous, apparently brick-red, with a broad yellow stripe down the middle;

Inner corona: lobes $1\frac{3}{4}$ lin. long, unequally 2-horned, glabrous, brick-red; inner horn 1 to $1\frac{1}{4}$ lin. long, erect, subulate; outer horn $\frac{1}{3}$ to $\frac{2}{3}$ lin. long, erect, subulate.

Type locality: Bechuanaland Protectorate: northern Kalahari: on the Botletle Flats, near Tame's and Rakop's villages, at about 3,000 feet elevation.

Distribution: Probably also from Southern Rhodesia: near Matetsi; and South West Africa: Great Namaqualand: Kuibis.

The "brick-red *Caralluma*" was discovered in tropical Bechuanaland Protectorate by Major Lugard in 1896. The flowers resemble those of *C. lutea* (not least in their surprisingly offensive odor), only their color is brick-red and their size $3\frac{1}{2}$ inches or more. It was the color which determined the specific name, *later* meaning a brick in Latin. The same root occurs in the name given to the brick-red clay of tropical countries, known as the Laterite. The distribution of the plant is only imperfectly known. It is easily confused with *C. nebrownii*, and the latter may turn out to be a variety. The differences between the two appear to be limited to a modification in color and an altered pattern in the outer corona-lobes.

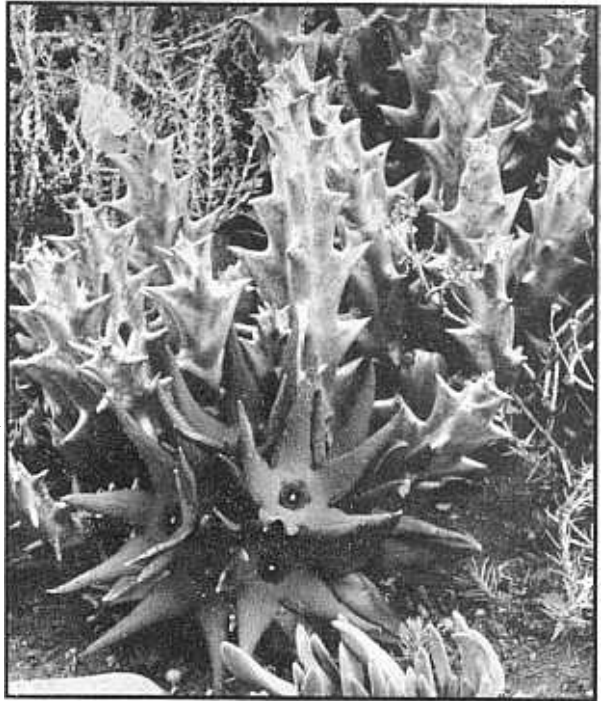


FIG. 308

Caralluma lateritia N. E. Brown x 0.5
Photo by S. Tapscott. Identification uncertain.

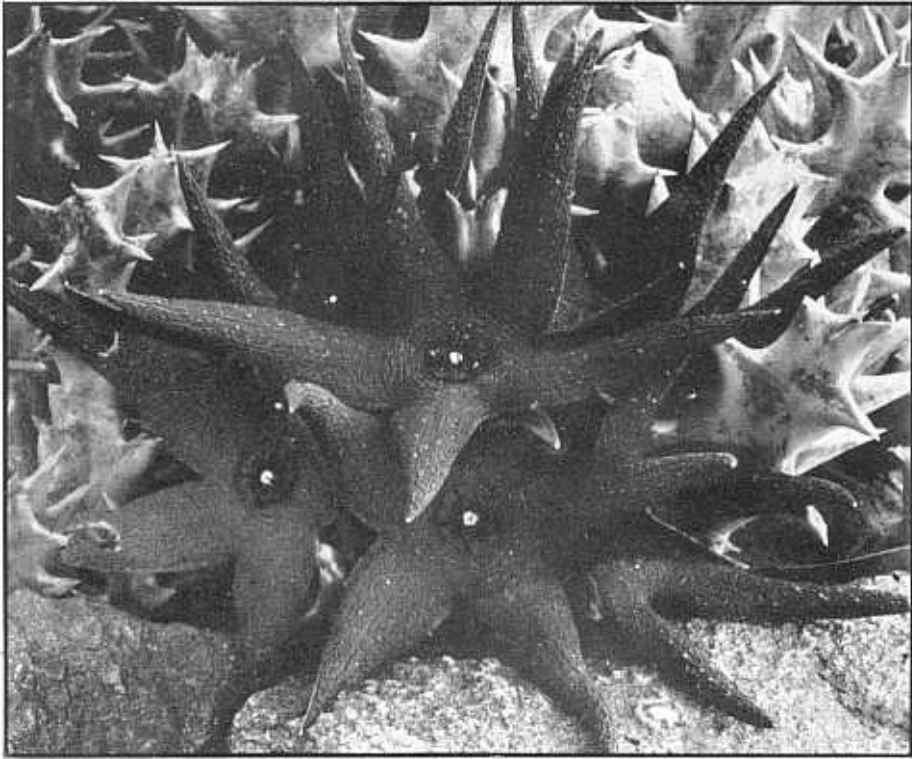


FIG. 309

Caralluma lateritia N. E. Brown

Photo by S. Tapscott. Identification uncertain. Mr. Tapscott says: "Grown from a cutting from a plant at the Bulawayo Museum. It is deep maroon red. It has a viler smell than any other plant I know."

Var. a. *Caralluma lateritia* var. *stevensonii*, var. nov.

(Description by A. White and B. L. Sloane):

Stems: green and conspicuously mottled in the sun, smaller than in the type and with less prominent teeth, the teeth stated to be without denticles at the base;

Flowers: in clusters on lower part of the stems;

Sepals: greenish, with long tapering points, extending beyond the sinuses between the corolla-lobes;

Corolla: to 13 cm. in diameter; deeply lobed, light brownish-maroon on inner face with groups of yellow spots near the centre and medially; *lobes* very slender, with sparse ciliation (thickest at base) of long vibratile clavate purple hairs 3 mm. long; outer surface 5-nerved;

Outer corona: shallow bowl-shaped, with broad lobes terminating in 3 acute teeth, the lateral teeth diverging;

Inner corona: lobes incumbent on the anthers; apparently not produced above them;

Staminal column: the top of the style shows yellowish-white between the corona-lobes.

Type locality: Southern Rhodesia: Matetsi, 32 miles south-east of Victoria Falls.

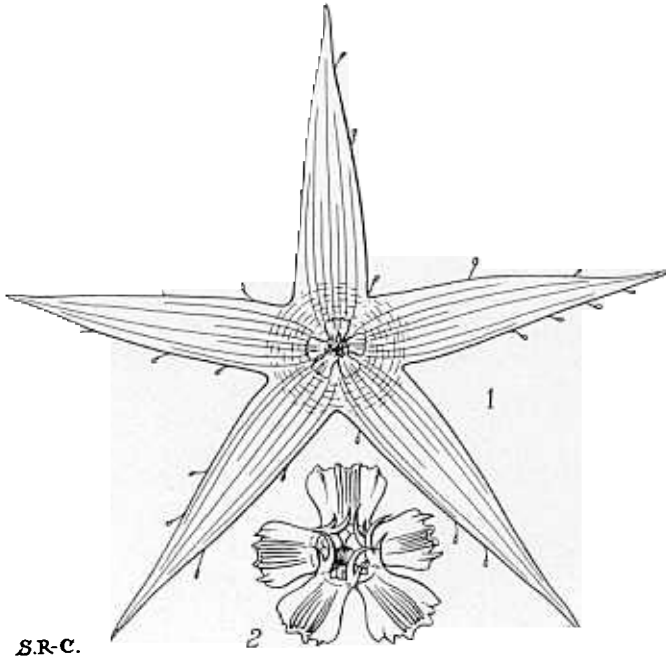
Distribution: Not further known.

This variety has the largest flowers of any *Caralluma*, about 5 inches in diameter. It was discovered by Capt. R. H. R. Stevenson in 1934, near Matetsi, Southern Rho-

desia, growing in Karroo sand veld in a tree-shaded spot. Plants believed to be the type of *C. lateritia* were found in the same section.

Only a single colony of the variety was found, covering over two square yards. We have described the plant from notes and a dried flower sent us by Capt. Steven-

son. It resembles the type, but differs in several important particulars. The stems are smaller, and the teeth smaller also and apparently without denticles at their base. The corolla-lobes are very much longer and proportionately more slender, and they are dotted near the disk and nearly to the apex with clusters of small yellow dots.



S.R.C.

FIG. 310

Caralluma lateritia N. E. Brown

1. Corolla x 1.

2. Corona x 3.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

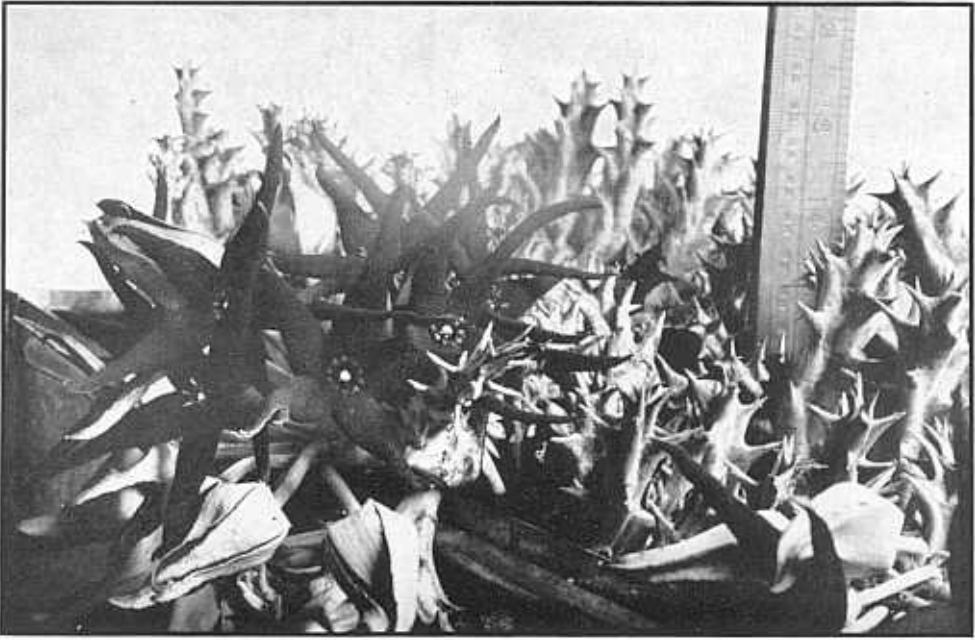


FIG. 311

Caralluma lutea var. *lateritia* Nel

Photo by G. C. Nel of a plant from Mopipi, British Bechuanaland

While these pages were in the hands of the printer, we received from our collaborator, Dr. G. C. Nel, the suggestion that *C. lateritia* is actually only a color variety of *C. lutea* (to be known, therefore, as *Caralluma lutea* var. *lateritia* Nel, comb. nov.). Dr. Nel writes: "I have had the plant hitherto known as *C. lateritia* flowering at the same time as *C. lutea*, and find that the two differ only in respect to color. I have collected both plants in neighboring areas,

so that on the ground of geographical distribution one could not object to the recognition of the variety." We believe Dr. Nel's diagnosis to be entirely sound, marking an important step in straightening out the difficult group of dark-flowered *Carallumas* related to *C. lutea*, and we would ask our readers to substitute the varietal designation wherever the name of *C. lateritia* occurs in our book.

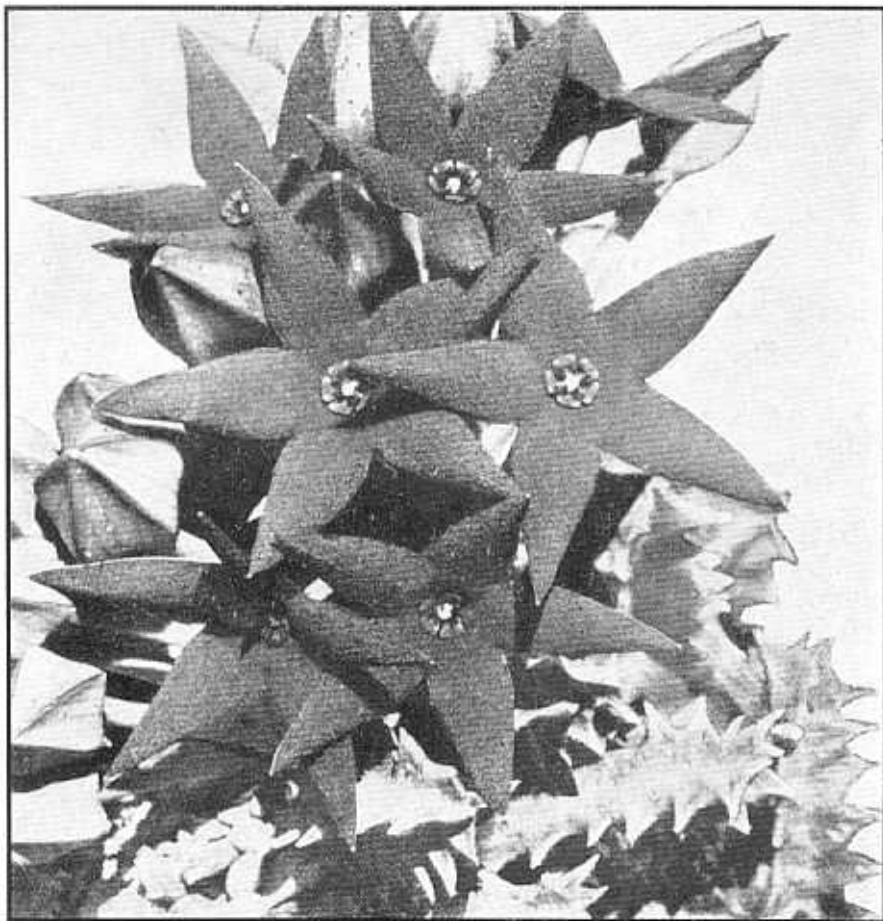


FIG. 312

Caralluma nebrownii Berger x 0.6

From Monatsschr. Kakt., 1914.

100. *Caralluma nebrownii* Berger, Berl. Bot. Gart., iv. 249. 1906.*Caralluma brownii* Dinter et Berger, Deutsch-Südwest-Afr., 113. 1909.

(Description based on that by A. Berger, Stap. und Klein., 85. 1910):

Stems: tufted, erect, 15 to 18 cm. long, up to 4 cm. thick excluding the teeth, 4-angled, green or greyish-green marbled with dull red spots; teeth $1\frac{1}{2}$ to 2 cm. long, up to 3 cm. apart, with 2 rudimentary denticles at the sides and a sharp gristly tip;

Flowers: in clusters of 15 to 30;

*Pedice*l: about 9 cm. long, glabrous;

Sepals: 9 to 10 mm. long, ovate-lanceolate, acute, glabrous;

Corolla: in bud ovate-acuminate, 5-angled, somewhat reddened; when expanded 9 to 10 cm. in diameter, almost rotate, uniformly dark red-brown, almost blackish-brown, transversely rugose and grooved, entirely glabrous; *lobes* 35 to 42 mm. long and about 17 mm. broad, ovate-lanceolate, with a groove along the apical third, slightly recurved at the margins, but not rolled back, sparsely ciliate with very vibratile clavate purple hairs, 4 mm. long;

Outer corona: bowl-shaped, lobes broadly rectangular, 5 mm. wide at the rim, variably toothed, more or less ridged at the edges, brown;

Inner corona: lobes shorter than the anthers, 4 mm. long, sickle-shaped and bent back, with a dorsal erect acute tooth about $1\frac{1}{2}$ mm. long, forming a dorsal connection to the sinuses between the outer corona-lobes, brown;

Anthers: yellow.

Type locality: South West Africa: Ovamboland: Olukonda.

Distribution: throughout tropical South West Africa, from Windhoek north to the Etosha Pan and Ovamboland.

"N. E. Brown's *Caralluma*" was discovered in Ovamboland, in the northernmost section of tropical South West Africa, by Prof. Hans Schinz in 1885, along with a number of other Stapeliads. These only became known, however, when later explorations in South West Africa turned the attention of Alwin Berger and other botanists to the Schinz Herbarium in Zurich. Thus it came about that *Caralluma nebrownii* was named in honor of Dr. Brown 21 years after its original discovery. The plant has stocky stems, 6 to 7 inches high, with prominent teeth rather far apart along the angles, bearing two lateral denticles after the manner of *Duvalia*, *Piaranthus*, *Huerniopsis* and *Stultitia*. Several other *Carallumas*, including *C. rogersii*, *C. lateritia*, *C. lutea* and *C. melanantha* have these rudimentary denticles at the base of the teeth. The flowers of *C. nebrownii* are 4 inches in diameter, dark red-brown, wholly glabrous, transversely rugose,

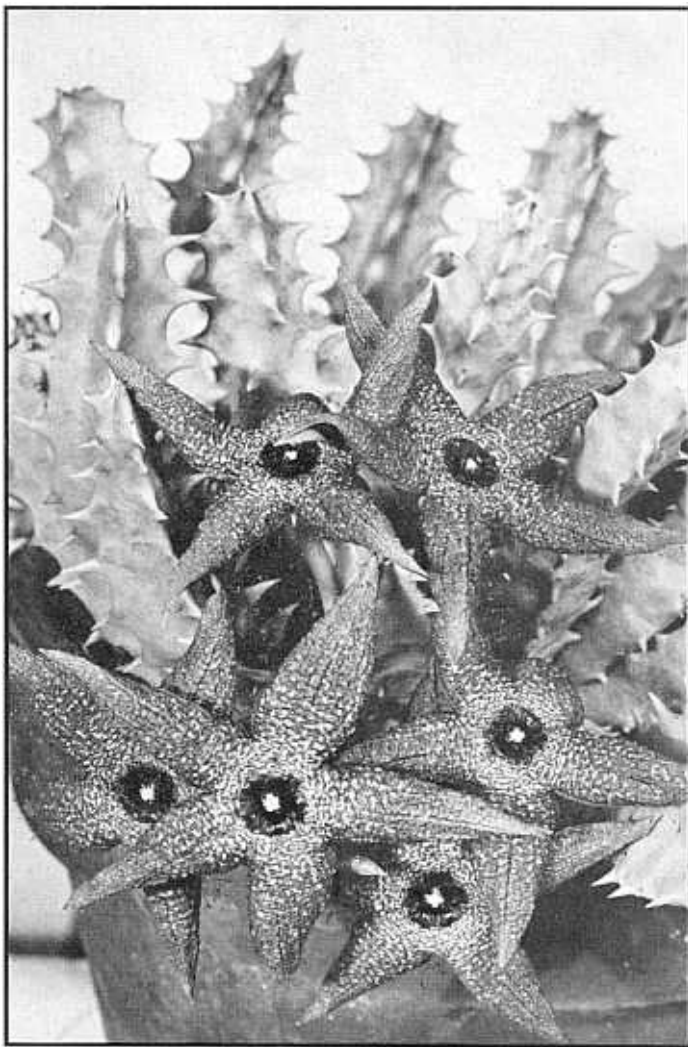


FIG. 313

Caralluma nebrownii var. *pseudo-nebrownii*, comb. nov. x 0.7

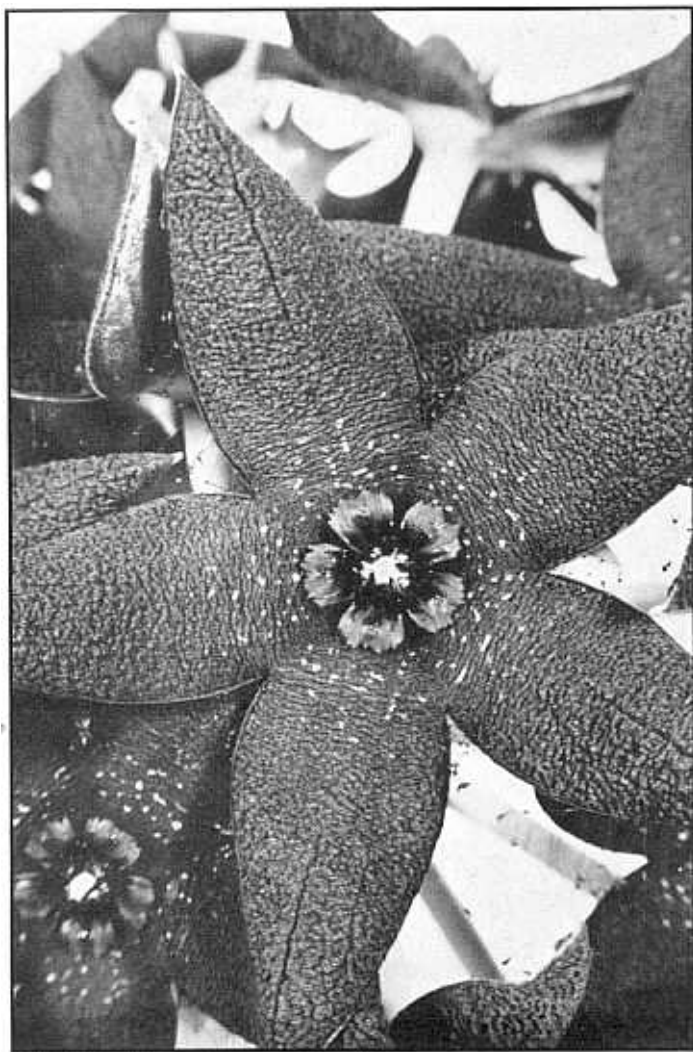


FIG. 314

Caralluma nebrownii f. *intermedia* x 1.5

the corolla-lobes deeply cleft and sparingly fringed with vibratile and easily detached clavate purple hairs. The outer corona is bowl-shaped, the lobes slightly cleft, broad and rectangular at the top edge, which is variably toothed; the inner corona-lobes have a dorsal horn forming a connection with the sinuses between the outer corona-lobes. The species is related to *C. lutea*, but may be distinguished immediately by the color of the corolla; it is also related to *C. valida*, from which it differs through its much larger flowers. Its closest connection is with *C. lateritia*, which has shorter pedicels, the corolla brick-red, and a different outer corona, less closely cup-shaped, with the lobes more deeply cleft.

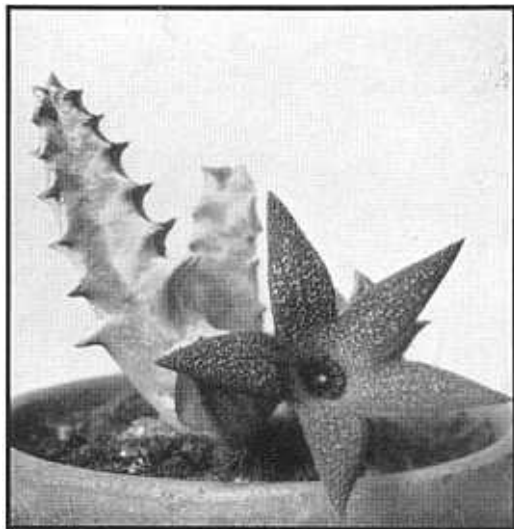


FIG. 315

Caralluma nebrownii var. *pseudo-nebrownii*,
comb. nov. x 0.5

From W. I. Beecroft Gardens. Photo by Havens.

Var. a. *Caralluma nebrownii* var. *pseudo-nebrownii* (Dinter), comb. nov.

Caralluma pseudo-nebrownii Dinter, Neue Pfl. Deutsch-Südwest-Afr., 17. 1914.

(Description summarized from that by Prof. Kurt Dinter, l.c., translated from the German):

Plant: 6 to 16 cm. high, forming large tufts which spread by creeping underground stems; *stems* 4-angled, greyish-green with conspicuous brownish-red spots; teeth $1\frac{1}{2}$ cm. long, $1\frac{1}{2}$ to 3 cm. apart, very acute; the older stems almost square in cross-section and with considerably shorter teeth, up to 3 cm. thick;

Flowers: in clusters of 5 to 15 on the younger stems;

Bracts: 2 to 3 mm. long, slender, obtuse;

Pedicel: 3 to 4 cm. long, 5 mm. thick, glabrous;

Sepals: 8 to 9 mm. long, lanceolate, acute, glabrous;

Corolla: in bud 4 to 5 cm. long, 5-angled, light red-brown, shiny, acute; when expanded 7 to 11 cm. in diameter, red-brown with yellow branching spots on the large swollen-looking rugosities, entirely glabrous; *disk* broadly campanulate; *lobes* 3 to $4\frac{1}{2}$ cm. long, 15 to 17 mm. broad at the base, lanceolate, with a groove upon the lobes as in the type, lightly recurved at the margins, sparsely ciliate with very vibratile clavate blackish-red hairs, 7 mm. long;

Outer corona: lobes 3 mm. long, 4 mm. broad, the rim obtuse and broadly toothed, tapering down on the sides, each lobe with a broad moist lacquered-looking stripe running lengthwise down the middle;

Inner corona: lobes 4 mm. long, sickle-shaped and bent back, with a dorsal suberect acute tooth about 2 mm. long, forming a connection to the sinuses between the outer corona-lobes.

Type locality: South West Africa: Keetmanshoop.

Distribution: Frequent throughout South West Africa below the tropic, especially in the central and southern parts of Great Namaqualand. Also in Cape Prov.: Kenhardt Distr.: Kakamas; Bechuanaland: Gordonias: Upington.

FIG. 316

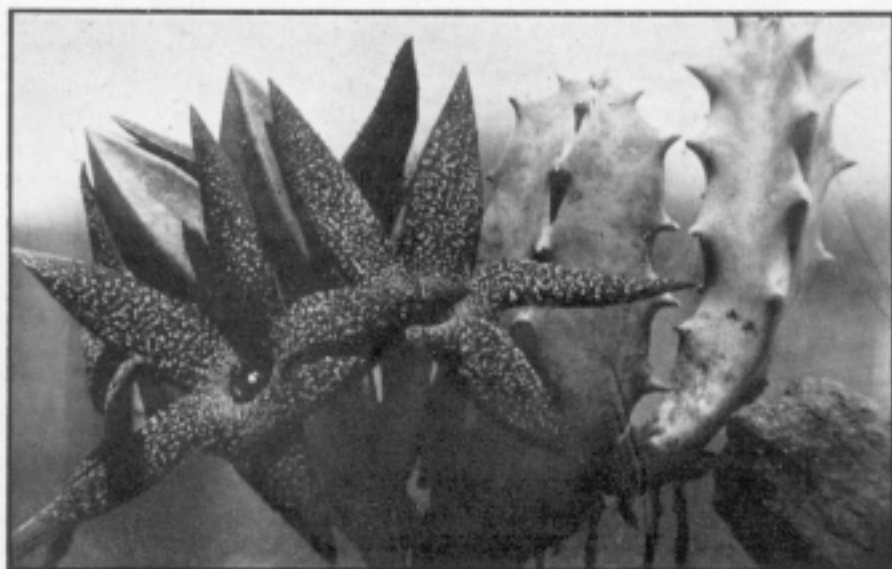
Caralluma nebrownii
f. *intermedia* x 0.5



FIG. 317.

Caralluma nebrownii
var. *pseudo-nebrownii*,
comb. nov. x 0.7

Photo by Prof. Dinter in
Neue Pfl. D. S.-W. Afr.,
1914.



During his explorations in South West Africa, Prof. Dinter found the uniformly dark red-brown-flowered *Caralluma nebrownii* generally distributed in the tropical portions of the interior, but below the tropic line he was surprised to find plants similarly colored save for the addition of irregular yellow markings. The two plants were never present in the same area. For its confusing resemblance to the "true Brown," he named the new plant the "false Brown *Caralluma*" and closer examination revealed various other distinctions, which we believe to be of varietal, rather than of specific, character. The stems are more regularly rectangular in cross-section than are those of the "true Brown." The flower clusters are smaller, containing 5 to 15 flowers, instead of 15 to 25. The buds are more slender, the sepals for the most part shorter, the central united portion of the corolla more deeply tube-shaped, the corolla-lobes narrower and the rugosities differently shaped. The corona is approximately the same as in the "true Brown." The transition from the "true Brown" to the "false Brown" is



FIG. 318

Caralluma nebrownii var. *pseudo-nebrownii*, comb. nov. x 1.

marked by the existence of an intermediate form (*f. intermedia*) with scanty spots on the disk of the corolla and base of the lobes only.

Var. b. *Caralluma nebrownii* var. *discolor* Nel, var. nov.

This variety, collected by Ernst Rusch, resembles the type in every respect, except the color of the corolla, which is light lemon yellow. The type is No. 7366 in the Herbarium of the Stellenbosch Botanical Garden.

Type locality: South West Africa: Tsamap.

Distribution: Not further known.

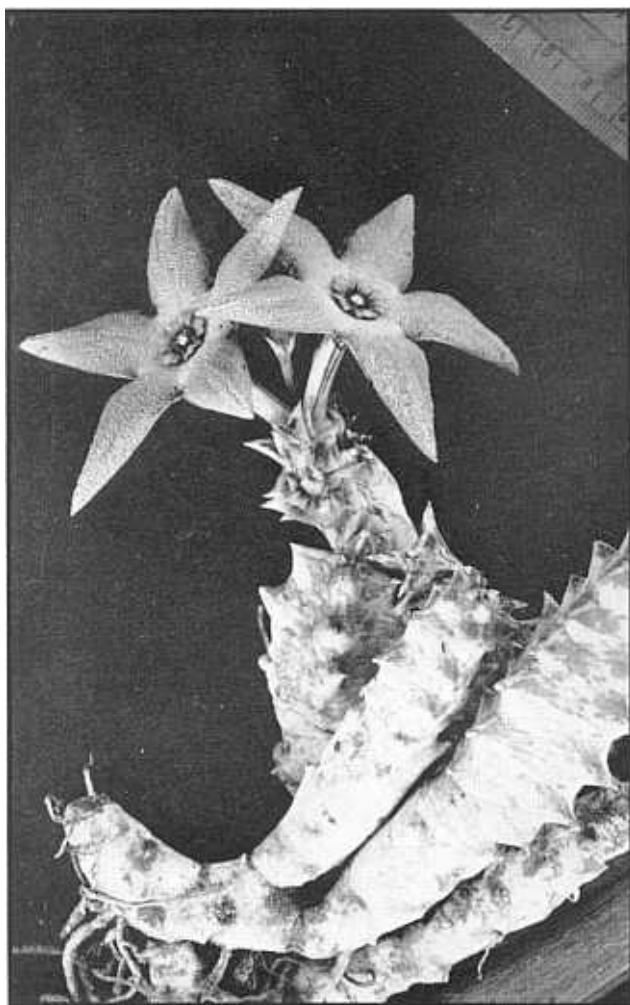


FIG. 319

Caralluma nebrownii var.
discolor Nel x 0.5

Photo by H. Herre.

101 *Caralluma vaga* (N. E. Brown), comb. nov.

Stapelia vaga N. E. Brown, Kew Bull., 265. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 501)

Stems: not seen;

*Pedice*l: $1\frac{1}{2}$ to 2 in. long, glabrous, moderately stout;

Sepals: $3\frac{1}{2}$ lin. long, ovate-lanceolate, acuminate, glabrous;

Corolla: star-like, $2\frac{1}{2}$ in. in diameter (or more?), apparently dark purple-brown; *lobes* about 1 in. long in the dried state, about 5 lin. broad, oblong-lanceolate, shortly acuminate, rugulose on the face, ciliate with long clavate vibratile purple hairs, otherwise glabrous;

Outer corona: lobes $1\frac{1}{2}$ to $1\frac{3}{4}$ lin. long, oblong, 4-toothed at the apex; two outer teeth a little lower down than the inner two;

Inner corona: lobes 2-horned; inner horn $1\frac{1}{2}$ lin. long, erect, subulate, recurving at the apex; outer horn similar, but much shorter.

Type locality: South West Africa: Ovamboland: near Olukonda north of the Etosha Pan.

Distribution: Not further known.

Discovered by Prof. Hans Schinz, Jan. 15, 1886, during his botanical explorations near the Etosha Pan, the great Drainage swamp in tropical South West Africa. As the name implies the species is an "uncertain" one. Hitherto it has been regarded as a *Stapelia*.

The stems have not been preserved. The flowers have a dark colored corolla, probably purple-brown, the lobes ciliate with vibratile clavate hairs. The lobes of the outer corona are 4-toothed, but the two side teeth set lower than the two middle teeth. A little broadening of the outer corona-lobes, a little more intergrowth at the base of the lobes, and we would have the exact coronal pattern of *C. knobelii* and *C. lutea*. And the inner corona-lobes, with their two horns "one above the other," the lower outer horn short, the inner horn much longer and recurving over the outer, seem to derive directly from *C. lutea*.

Hence, even in the present incomplete state of our knowledge regarding the species, the temptation to call it *Caralluma vaga* has proved too strong for us to resist.

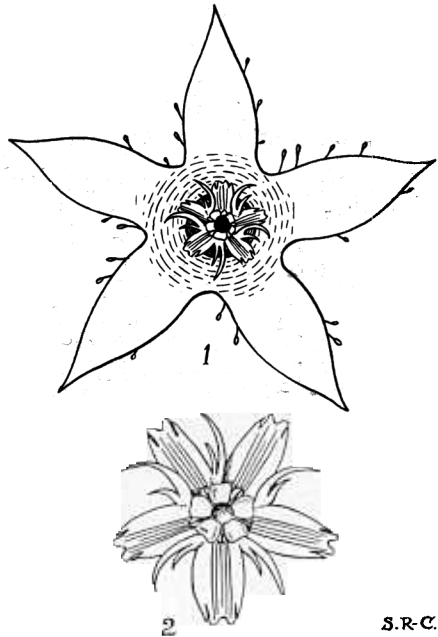


FIG. 320

Caralluma vaga, comb. nov.

1. Corolla x 1.

2. Corona x 3.

Drawn by Miss S. Ross-Craig from dried material in the Herbarium of the Royal Botanic Gardens, Kew.

102. *Caralluma valida* N. E. Brown, Kew Bull., 264. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 486):

Stems: glabrous, 4 in. or more high, 7 to 10 lin. thick excluding the teeth, probably 4-angled; angles with very stout conical acute spreading teeth $\frac{1}{2}$ to $\frac{3}{4}$ in. long and $\frac{1}{3}$ in. thick at the base;

Pedicel: 4 to 5 lin. long, glabrous;

Sepals: $3\frac{1}{2}$ lin. long, ovate-lanceolate, acuminate, recurving at the tips, glabrous;

Corolla: very deeply 5-lobed; lobes 8 to 9 lin. long, $2\frac{1}{2}$ lin. broad at the base, gradually tapering in a nearly straight line to an acute apex, rugose on the face, ciliate with long clavate vibratile purple hairs, otherwise glabrous, apparently dark brown-purple;

Outer corona: lobes $1\frac{1}{4}$ lin. long, shortly adnate at the base to the sides of the inner corona-lobes, oblong-lanceolate and acute, with a small blunt tooth on each side, or linear-oblong and subtruncate, 2 to 3-keeled down the inner face; beneath them on the very short staminal column are 5 small tubercles;

Inner corona: lobes $1\frac{1}{2}$ lin. long, connivent-erect, flat, broadly linear, rather deeply bifid at the apex, with the tips apparently recurving, crested at the base.

Type locality: Uncertain: Zambesi region, or in the Transvaal.

Distribution: Unknown.

The "strong *Caralluma*" was doubtless so called because of the powerful stems, 4 inches or more in height, which are armed with stout spreading teeth, up to $\frac{3}{4}$ -inch long. Its habitat appears to be in the Zambesi region or the Transvaal, and it was collected by Dr. Emil Holub in 1886 during his unsuccessful effort to traverse the African continent from Capetown to Cairo.

One piece of stem and several detached flowers survive as the only examples

of this imperfectly known species. Dr. Brown thought the flowers were produced in large umbels near the base of the young stems, as in *Caralluma lutea*, which seems to be its nearest ally. The flowers have been pressed out flat, but when alive they probably had a short campanulate or funnel-shaped tube $\frac{1}{3}$ to $\frac{1}{4}$ as long as the corolla-lobes. They are $1\frac{1}{2}$ to 2 inches in diameter, deeply lobed as in *C. lutea*, apparently dark purple-brown in color and ciliate with clavate vibratile purple hairs.



FIG. 321

Caralluma lugardi N. E. Brown x 1.

Photo by A. Probst and E. R. Svensson.

103. *Caralluma lugardi* N. E. Brown, *Flora Trop. Afr.*, iv. i. 487. 1904.

(Description by Dr. Brown, l.c.):

Plant: $2\frac{1}{2}$ to 3 in. high, branching at the base; *stems* $3\frac{1}{2}$ to 5 lin. thick, obtusely 4-angled, glabrous; angles with spreading stout subulate acute teeth $1\frac{1}{2}$ to $2\frac{1}{2}$ lin. long;

Flowers: in fascicles of 3 to 7, lateral below the apex of the stems, developing successively;

Bracts: $\frac{1}{2}$ to 1 lin. long, broadly ovate, acute;

*Pedice*l: $1\frac{1}{2}$ to 3 lin. long, $\frac{3}{4}$ lin. thick, glabrous;

Sepals: 2 to $2\frac{1}{2}$ lin. long, $\frac{1}{2}$ to $\frac{2}{3}$ lin. broad, lanceolate, acuminate, glabrous;

Corolla: $1\frac{1}{2}$ to $1\frac{3}{4}$ in. in diameter, very deeply 5-lobed, glabrous outside, very minutely puberulous within and sparingly ciliate with minute simple hairs, entirely bright chocolate, or the apical part of the lobes olive-green; *tube* $2\frac{1}{2}$ to 3 lin. long, campanulate; *lobes* $\frac{3}{4}$ to 1 in. long, $1\frac{1}{2}$ to 2 lin. broad at the base, linear-attenuate, acute, campanulately spreading;

Outer corona: 15 to 20-toothed, glabrous; basal part $\frac{1}{2}$ lin. long, cup-shaped, with 5 pairs of elongated-deltoid acute divergent blackish-purple teeth $\frac{3}{4}$ lin. long, alternating with the anthers, and 5 pairs of smaller teeth or 5 oblong entire or bifid lobes (often with a very minute middle tooth), opposite to and forming a dorsal projection from the inner corona-lobes, $\frac{1}{3}$ lin. long, dull purplish;

Inner corona: lobes 2 lin. long, subulate, connivent-erect, glabrous, dull orange.

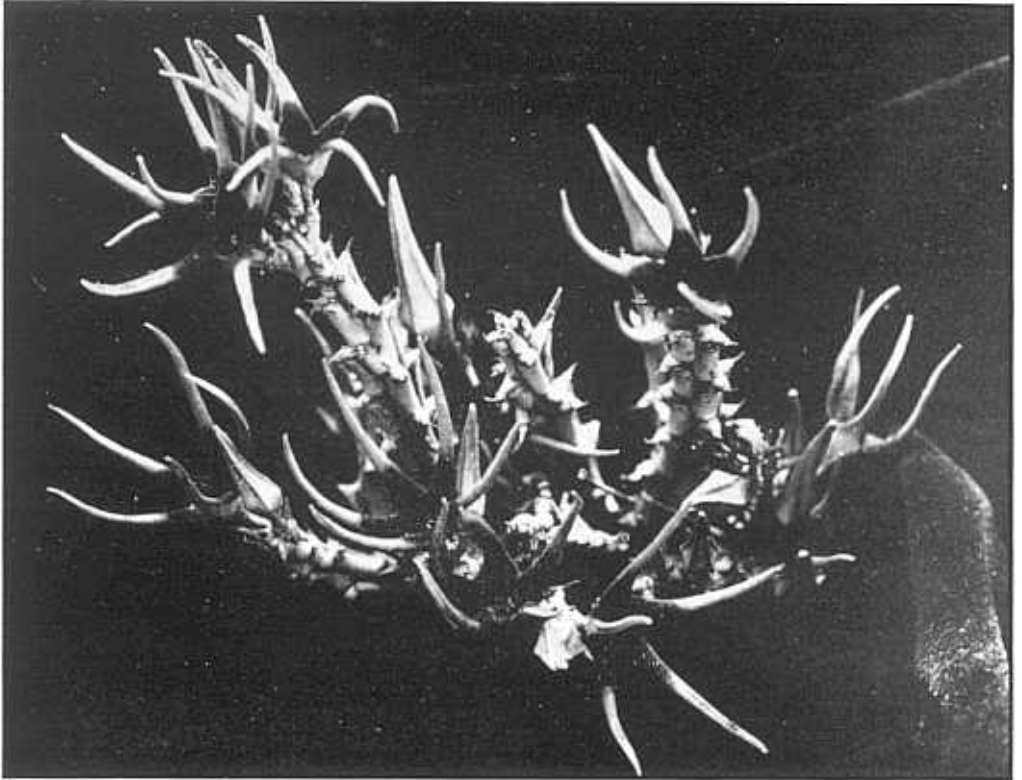


FIG. 322. *Caralluma lugardi* N. E. Brown x 1.
Flower with wine centre and green-yellow tips. Photo by E. B. W. Schoenfelder.

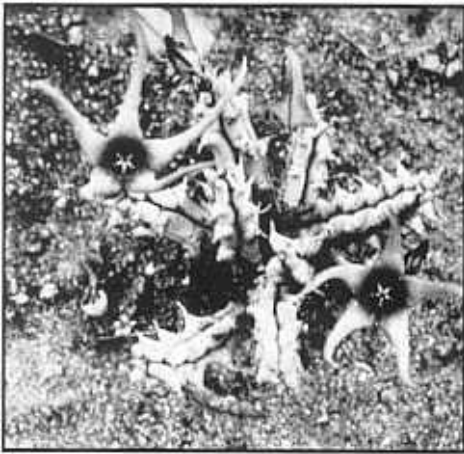


FIG. 323
Caralluma lugardi N. E. Brown x 0.75
Flower with green centre and yellow tips.
Photo by E. B. W. Schoenfelder.

FIG. 324. *Caralluma lugardi* N. E. Brown x 1.
Flower all wine color. Photo by
E. B. W. Schoenfelder.



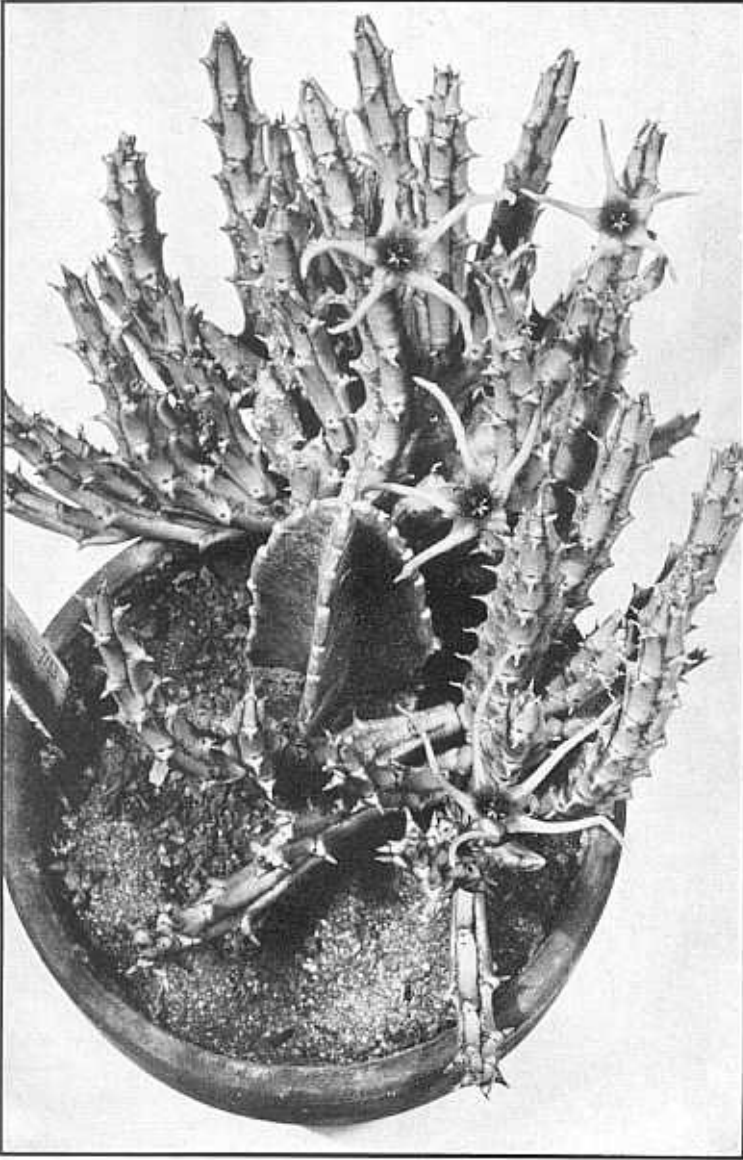


FIG. 325

Caralluma lugardi N. E.

Brown x 0.75

A grafted plant.

Type locality: Bechuanaland Protectorate: Ngamiland: Totin, near Lake Ngami.

Distribution: Also from Cape Prov.: Prieska Distr.; South West Africa: Windhoek; Okahandja; Rehoboth; and other points south to Keetmanshoop.

"Lugard's *Caralluma*" was discovered by Major (then Capt.) E. J. Lugard while on the British West Charterland Company's expedition to Lake Ngami in the Kalahari region of the Bechuanaland Protectorate in 1896-97. The plant is 3 to 6

inches high, branching from the base, the stems with stout acute teeth. The flowers form in small fascicles at the sides of the stems, the corolla deeply cleft into slender curving lobes. The color, according to N. E. Brown's description, is entirely bright



FIG. 326

Caralluma lugardi N. E. Brown x 1.

Photo by Prof. K. Dinter in Neue Pfl. D. S.-W. Afr., 1914.

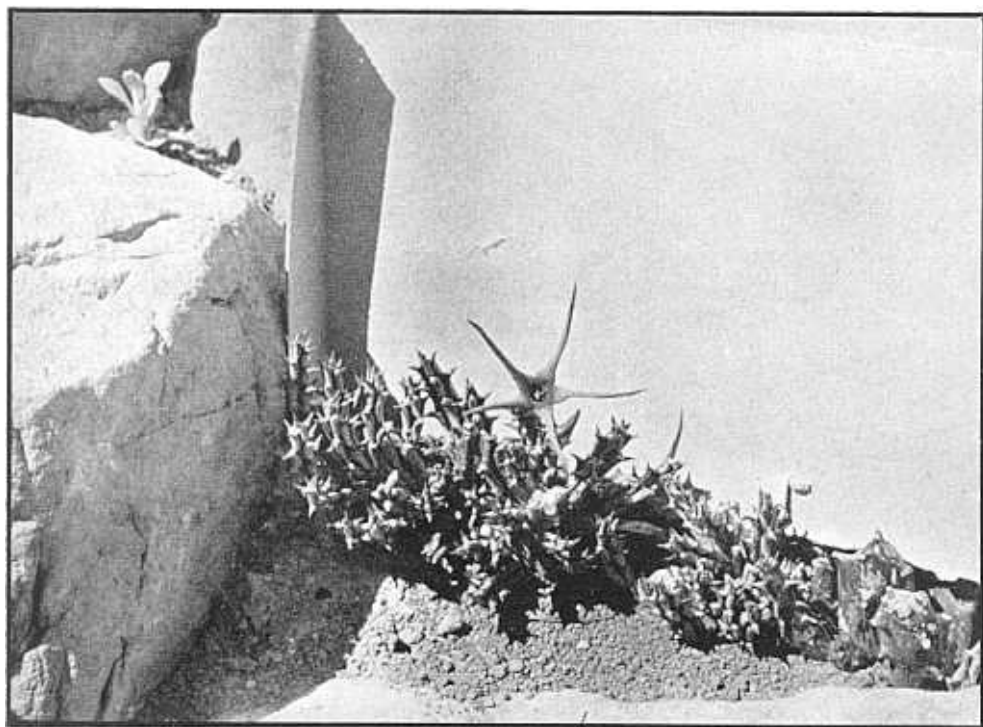


FIG. 327

Caralluma lugardi N. E. Brown

Photo by R. H. N. Smithers of a plant from the Waterberg Mountains, South West Africa.



PLATE VI.

Caralluma lugardi N. E. Brown x 1.

Illustrating the two color schemes mentioned in the description of Dr. N. E. Brown. From an original water color drawing by Carl Luckhoff.

chocolate, or sometimes the upper half of the lobes is olive-green. E. B. W. Schoenfelder reports three color patterns as found in South West Africa, of which the first two correspond to those described by Dr. Brown: (1) all wine color; (2) wine centre with green-yellow tips; and (3) green centre, with yellow tips.

The corona is of complex construction. The inner corona-lobes each have a dorsal projection, consisting of a small tooth or a pair of small teeth, connecting with the bowl-shaped outer corona. The outer

corona, in lieu of more distinct lobes, is rimmed with five pairs of small acute teeth; so that the entire corona produces the composite effect of an intricate 15 or 20-toothed cup.

Miss Verdoorn calls our attention to a plant collected by B. Levy on the farm of Mr. Geise, 20 miles from Wankie, Southern Rhodesia: "It seems very like *C. lugardi* but differs markedly in its corona, the inner lobes having a thick obtuse lobe behind the much smaller deltoid apex, and the outer being without teeth and white."

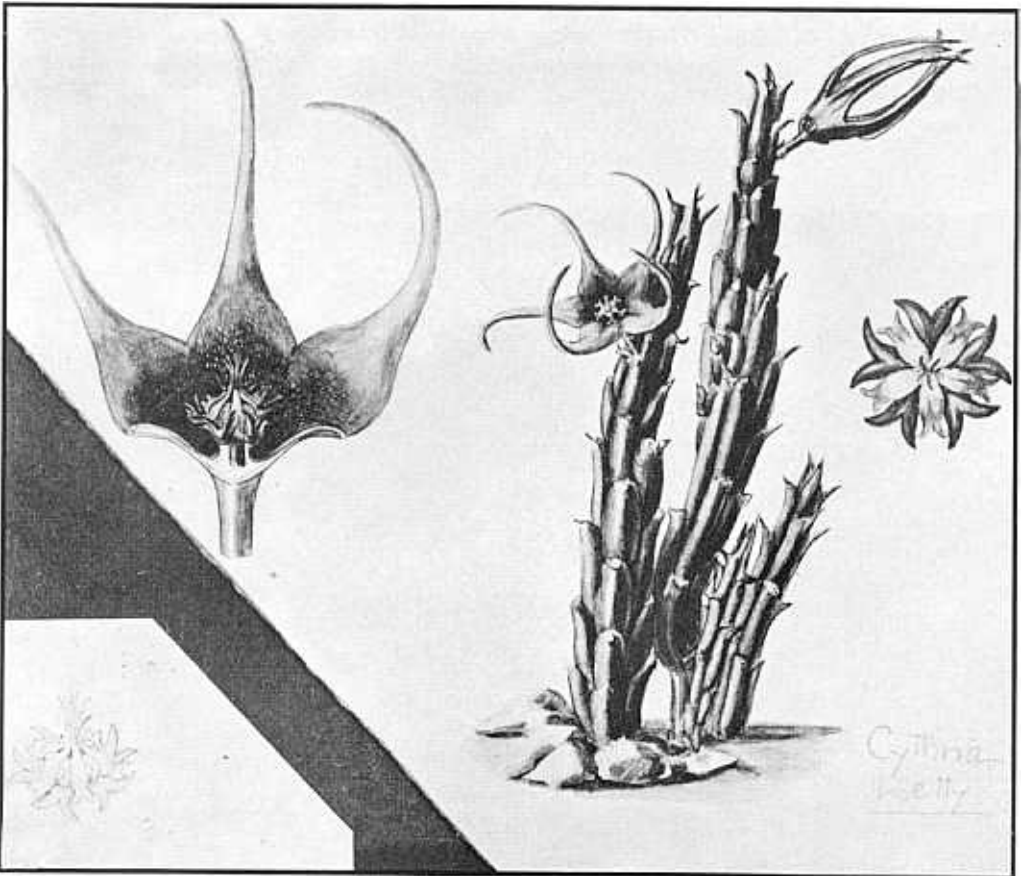


FIG. 328

Caralluma lugardi N. E. Brown x 1.

From the original water color drawing by Miss Cythna Letty for the
Flowering Plants of South Africa, 1932.

104. *Caralluma longicuspis* N. E. Brown, Flora Cap., iv. i. 884. 1909.

(Description by Dr. Brown, l.c.):

Plant: "2 to 3 in. high; *stems* erect, decumbent or descending underground, $1\frac{1}{4}$ to 6 in. long, $\frac{1}{4}$ to $\frac{3}{4}$ in. thick" (*Pillans*), 4-angled; with slightly concave or grooved sides, greyish-green (greyish-blue, *Pillans*) mottled with brown, angles rounded, with conical acute deciduous grey teeth 1 to $1\frac{1}{2}$ lin. long;

Flowers: in fascicles of 3 to 10, thickly distributed along the sides of the stems from the top to near the bottom, developing successively, erect;

Pedicel: 2 to $2\frac{1}{2}$ lin. long, glabrous;

Sepals: $1\frac{3}{4}$ lin. long, lanceolate or ovate-lanceolate, acuminate, glabrous;

Corolla: comparatively large, glabrous and greyish-green outside, inner surface densely and very minutely papillate, with a very minute ciliation at the base of the lobes, otherwise glabrous, "pale purple merging into purple in the tube" (*Pillans*), drying dark purplish-olive-brown; *tube* 2 lin. long and 4 lin. broad, shortly funnel-shaped; *lobes* erectly spreading, $\frac{3}{4}$ to 1 in. long, $2\frac{1}{2}$ to $2\frac{3}{4}$ lin. broad, linear-lanceolate, acute, with recurved margins;

Outer corona: dark purple-brown, shortly cupular at the base, 20-toothed, with the 5 pairs of teeth opposite the corolla-lobes $\frac{3}{4}$ lin. long, falcate-subulate, with the tips widely diverging, and the 5 alternating pairs (really short bifid projections from the base of the inner corona-lobes) very much shorter, straight and contained between the adjacent teeth, whose tips arch over them;

Inner corona: lobes $2\frac{1}{2}$ lin. long, linear-lanceolate and closely incumbent at the base on the backs of the anthers, produced beyond them into long filiform tips connivent into an erect slender column, dark purple-brown.



FIG. 329

Caralluma longicuspis
N. E. Brown x 1.

Photo by S. Tapscott.

Type locality: South West Africa; without precise locality.

Distribution: Also from Cape Prov.: Griqualand West: near Kimberley; Prieska Distr.?

Caralluma longicuspis was received by Mr. Pillans from South West Africa, and Mr. Tapscott reports a single plant on his former farm near Kimberley. A third record, from Prieska district, is uncertain. The name of the species derives from the "long points," or lobes, of the corolla, whose acutely linear shape is accentuated by their recurved margins. The entire inner face of the corolla is densely papillate, with a minute ciliation at the base of the lobes, the color a pale purple merging to a darker purple within the small funnel-shaped tube.

The inner corona-lobes are produced above the anthers in a slender erect column. At the back each has a projection, consisting of a pair of tiny teeth, which connects

with the rim of the cup-like outer corona. As the rim of the outer corona is itself formed of five pairs of teeth, with widely diverging tips arching over the dorsal teeth of the inner corona-lobes, the corona as a whole is an extremely intricate structure, somewhat like a 20-toothed cup, at whose centre the inner corona-lobes rise in a columnar bundle.

In its complex corona, its attenuate corolla-lobes and other features *C. longicuspis* recalls *C. lugardi* so closely that it could perhaps be properly considered as a variety of the latter. However, the general appearance of the stems, the larger flowers and more densely papillate corolla provide characters sufficiently distinctive to enable it to retain its specific rank.

Caralluma rogersii



FIG. 330

Caralluma rogersii Bruce et Dyer x 2.

Photo by Herbert Lang.

105. *Caralluma rogersii* (L. Bolus) E. A. Bruce et R. A. Dyer, Kew Bull., 303. 1934.

Stapelia rogersii L. Bolus, Ann. Bolus Herb., i. 194. 1915.

(Description by Mrs. Bolus, l.c., translated from the Latin):

Stems: ascending or erect, 4-angled, grooved between the rounded angles, glabrous, greenish, up to 10 cm. high, 8 mm. in diameter excluding the teeth; teeth suberect or spreading, subulate, very acutely acuminate, 1 to 1.8 cm. long, up to 5 mm. thick at the base;

Flowers: in 3 or 4 fascicles along the stem, very often 2 open simultaneously in a fascicle;

Pedicel: 1.3 to 1.5 cm. long, 1.5 mm. in diameter, glabrous;

Sepals: 3 to 4 mm. long, lanceolate, acuminate, glabrous;

Corolla: pale dull yellowish, 3 to 3.5 cm. in diameter when fully expanded; *disk* 5 mm. in diameter, densely covered with short globose pellucid papillae; *lobes* ascending-incurved, more rarely spreading, linear-acute, replicate above the middle, minutely papillate inside, glabrous on the back, ciliate from below the middle to the base with multicellular pellucid hairs, 1 mm. long, globosely swollen at the apex, directed inwards;

Outer corona: lobes spreading from the base and curved upward, oblong, channeled on the inner face, 3-toothed at the apex, barely 3 mm. long;

Inner corona: lobes erect, bifid almost to the base; outer segment 5 mm. long, entire, filiform; inner segment 3-partite down to the anther, with the parts altogether alike, filiform, attenuate, 8 mm. long, twisted and interwoven at the tips.

Type locality: Bechuanaland Protectorate: Mahalapye.

Distribution: Also from Bechuanaland Protectorate: Boatlaname; Southern Rhodesia: Palm Forest in Lower Sabi Valley; Transvaal: Pietersburg Distr.: Mokeetsi.

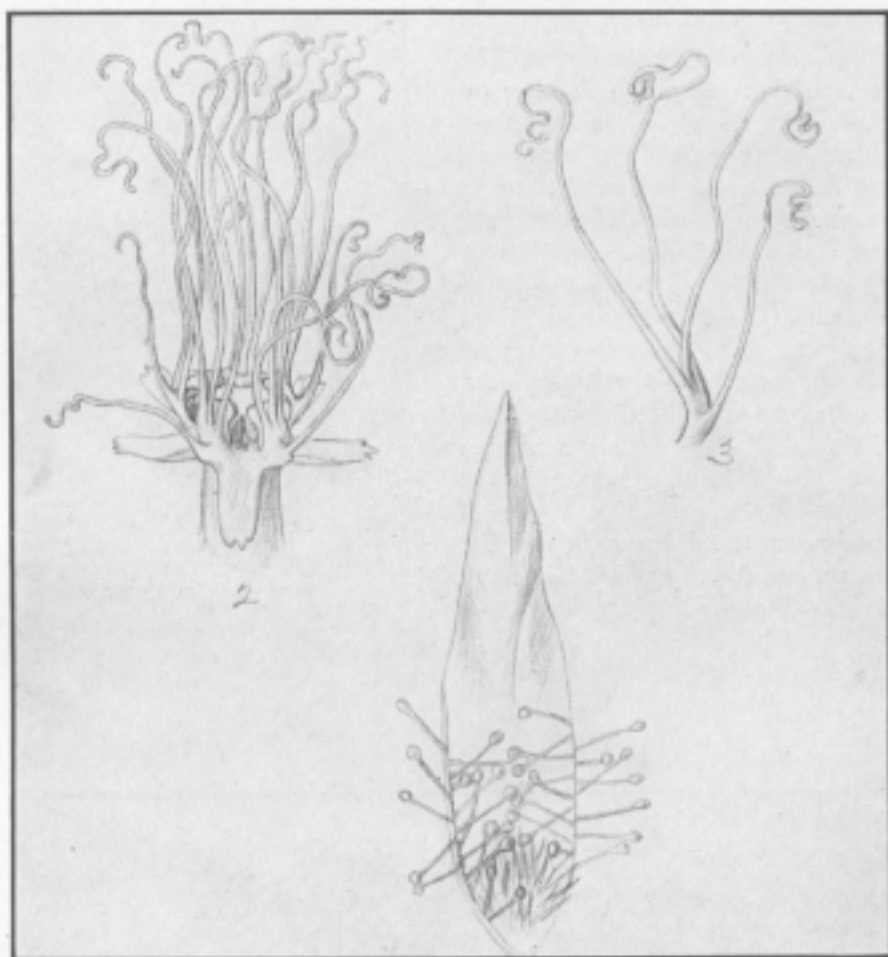


FIG. 331

Caralluma rogersii Bruce et Dyer

Enlargement of the corona and a corolla-lobe, from a drawing by Miss Cythna Letty in the Flowering Plants of South Africa, 1935.

A very distinct tropical species, gathered in the northern part of the Bechuanaland Protectorate by Archdeacon Rogers prior to 1915. The stems are 4 inches high, with

rounded angles. The teeth are extremely long, up to $\frac{3}{4}$ -inch, and this feature, with the minute denticles they often bear at the base and the occasional mottling of the

stems, makes the general habit of the plant resemble that of *Stultitia tapscottii*. The flowers have a pale yellow corolla, roughened on the inner face with short globose papillae. The disk is covered with short pellucid hairs, and the corolla-lobes are ciliate on the basal half with clavate hairs, whose crystalline appearance has been described by Dr. E. P. Phillips as "producing a glistening effect in the flowers."

The corona is an extraordinary one. The outer corona-lobes are oblong and channeled down the centre, while the inner corona-lobes are formed of two segments, the outer filiform and free almost to its base, the inner deeply 3-partite (or in specimens from Southern Rhodesia sometimes 2-partite?), the filiform divisions elongated and fancifully coiled and twisted at the apex. The inner and outer corona-lobes are united at the base. This coronal intergrowth, combined with the linear replicate shape of the corolla-lobes, has recently led Miss Bruce and R. A. Dyer to transfer the species from *Stapelia* to *Caralluma*. It should be kept in mind, however, that the *shape* of the outer corona-lobes is more nearly akin to *Stapelia* than to *Caralluma*, and that the unique inner corona-lobes are wholly foreign to the *Caralluma* tradition

and have no counterpart among *Stapelias* either. The architecture of the entire corona will probably lead ultimately to the transfer of the species to a genus all its own.

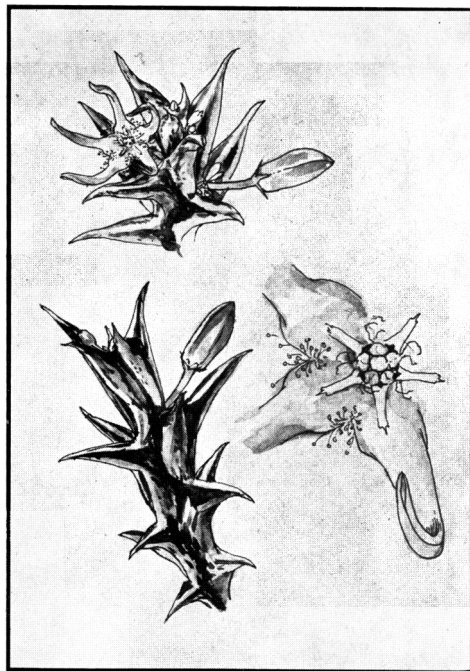


FIG. 332

Caralluma rogersii Bruce et Dyer $\times 0.6$

From a drawing in the Bolus Herbarium, Kirstenbosch.



FIG. 333

Caralluma rogersii Bruce et Dyer $\times 0.75$

From the collection of David Pringle.



PLATE VII.

Caralluma rogersii E. A. Bruce et R. A. Dyer

From the original water color drawing by Miss Cythna Letty
for the Flowering Plants of South Africa, 1935.

STULTITIA Phillips, Flow. Pl. So. Afr., text. ad t. 520. 1933.

Stapeliopsis Phillips, Flow. Pl. So. Afr., t. 445. 1932. *Nec* Pillans, 1928.

Type species: *Stultitia cooperi*.

Total species: 2.

Distribution: Cape Province, Transvaal and Bechuanaland Protectorate.

Dr. E. P. Phillips in 1932 created a new genus to provide for the species formerly known as *Stapelia cooperi*, of which he wrote: "The corona definitely excludes it from *Stapelia*, whilst the raised annulus on the corolla is a character which is not found in any species of *Caralluma* so far as we know." The name first chosen by Dr. Phil-

lips for the new genus, *Stapeliopsis*, proved to be anticipated. To censure himself for this oversight Dr. Phillips substituted the name *Stultitia*, which might be translated as "carelessness." "The reference," Dr. Phillips writes us whimsically, "is to the author's methods, not to the plant!"

KEY TO THE GENUS STULTITIA

- | | |
|---|--|
| I. Stem teeth only $\frac{1}{4}$ -inch long, conical-tapering | 1. <i>S. cooperi</i> ($1\frac{1}{2}$ in.) |
| II. Stem teeth up to $\frac{3}{4}$ -inch long, very long-tapering | 2. <i>S. tapscottii</i> (2 in.) |

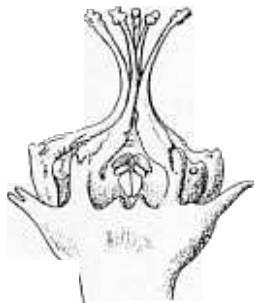


FIG. 334
Corona of *Stultitia tapscottii* Phillips
From a drawing by Miss Cythna Letty in the
Flowering Plants of South Africa, 1933.

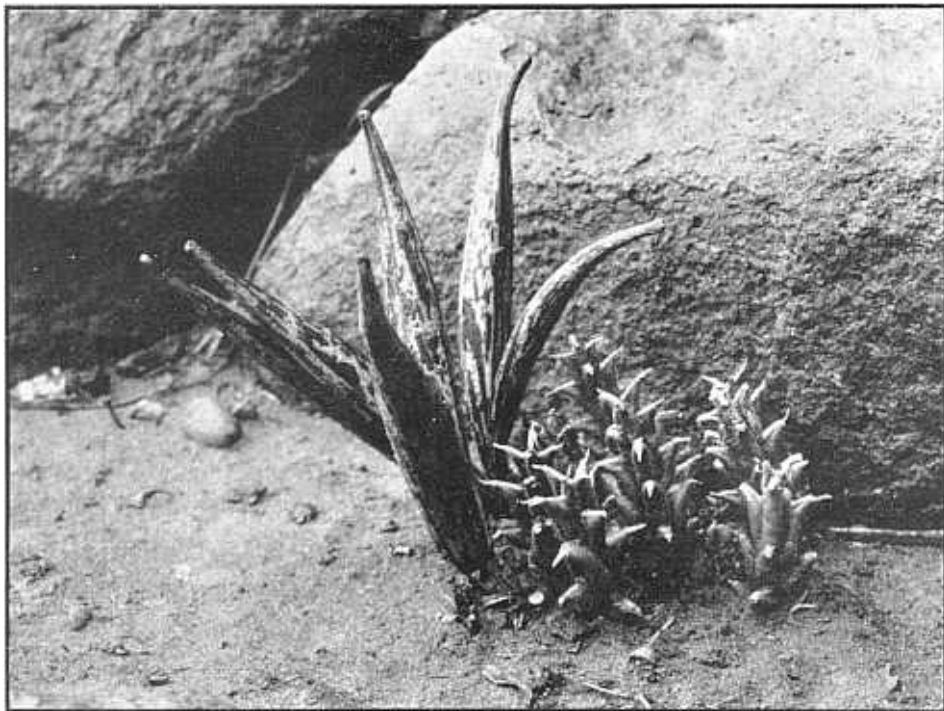


FIG. 335

Seed-pods of *Stultitia cooperi* Phillips

Photo by S. Tapscott.

1. *Stultitia cooperi* (N. E. Brown) Phillips, Flow. Pl. So. Afr., text. ad t. 520. 1933.*Stapelia cooperi* N. E. Brown, Flora Cap., iv. i. 974. 1909.*Stapeliopsis cooperi* Phillips, Flow. Pl. So. Afr., t. 445. 1932.

(Description by Dr. Brown, l.c.):

Stems: erect or ascending, $1\frac{1}{2}$ to 2 in. high, 4 to 5 lin. thick excluding the teeth; angles obtuse, with spreading conical very acute teeth $2\frac{1}{2}$ to 3 lin. long, having a minute tooth on each side at their middle, glabrous, green or greyish-green with chocolate-colored or dark green spots and lines;

Flowers: gradually developed 1 to 3 at a time up to 10 or more from a sessile cyme or cluster at the base of the stems;

Pedice: 3 to 6 lin. long, glabrous;

Sepals: 2 to $2\frac{1}{4}$ lin. long, ovate or ovate-lanceolate, acuminate, glabrous;

Corolla: $1\frac{1}{3}$ to $1\frac{1}{2}$ in. in diameter, flat, with stellately spreading or recurving lobes and an annulus on the disk, glabrous, smooth and "olive-color with dashes or longitudinal streaks of purple" (Pillans) on the back, rugose on the inner surface with minute crowded tubercles and short transverse ridges on the lobes and crowded minute tubercles on the annulus or lower part of it, ciliate on the basal half of the lobes with vibratile clavate purple hairs, otherwise glabrous, "light purple, with all the rugosities colored yellow" (Pillans), "dull yellow, with fine purple-brown lines" and the annulus "purplish-pink" (Marloth); lobes 5 to 7 lin. long, $4\frac{1}{2}$ to 5 lin. broad, ovate, acute, somewhat convex from the slightly recurving margins; annulus 4 to $4\frac{1}{2}$ lin. in diameter, pentagonal, solid, cushion-like, with sloping sides and a central depression containing the corona;

Outer corona: resting upon the cup of the annulus, somewhat saucer-like and subequally 10-toothed or with 5 short bifid or emarginate lobes $\frac{1}{2}$ lin. long and $\frac{3}{4}$ lin. broad, with obtuse or subacute

deltoid teeth having a broadly triangular notch between them, "rich purple" (Pillans), "deep maroon" (Marloth);

Inner corona: lobes $1\frac{1}{4}$ to $1\frac{1}{2}$ lin. long, with their basal part ascendingly incumbent on the backs of the anthers and dorsally connected to the outer corona by a stout basal projection, broadly ovate, oblong or ovate-oblong, entire or with 1 to 2 teeth on each side, apical part filiform or subulate, connivent-erect or with recurving and sometimes slightly clavate tips, pale yellow, minutely speckled with purple;

Follicles: slightly diverging, about $3\frac{1}{2}$ in. long and $\frac{1}{3}$ in. thick, fusiform, acute, glabrous, smooth, densely streaked with dark purple-brown on a pale ground color.

Type locality: Cape Prov.: Cradock Distr.: near Cradock.

Distribution: Also from Van Rhynsdorp Distr.: near Van Rhynsdorp; Middelburg Distr.: 2 miles east of Conway Station; Hopetown Distr.: near Hopetown; Prieska Distr.: near Prieska; Griqualand West: Hay Distr.: Postmasburg; Herbert Distr.: Douglas; Mazelsfontein; Orange Free State: Jacobsdal Distr.: on road to Jacobsdal.

"Cooper's *Stultitia*" is a very striking plant, discovered by Thomas Cooper in the Cradock Division of the Cape Province

about 1860. The stems have obtuse angles and long conical teeth bearing minute denticles on each side of the middle. Similar denticles garnish the teeth of the second species of *Stultitia*, *S. tapscottii*. The flowers of *S. cooperi* are reddish, with cream-colored transverse rugosities and a lighter colored annulus, which supports the edge

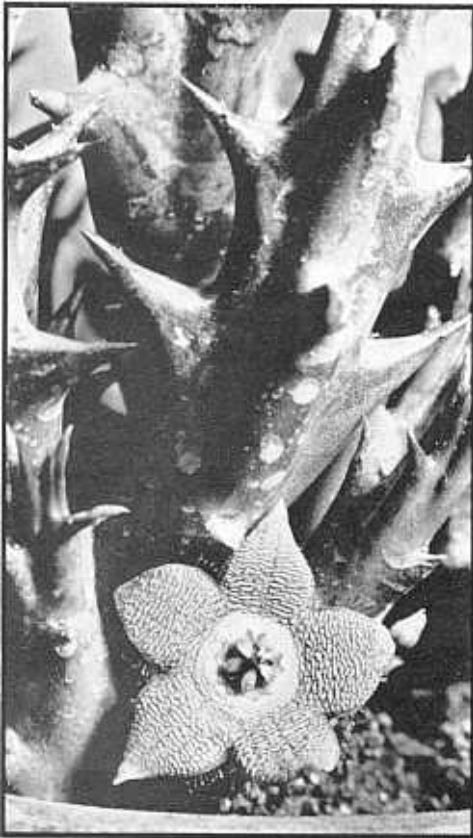


FIG. 336

Stultitia cooperi Phillips x 1.2



FIG. 337

Stultitia cooperi Phillips x 2.

of the outer corona, somewhat as did the convex non-annular corolla centres in *Stapelia longidens* and *Stapelia woodii*. The outer corona is variable, the 2-toothed lobes more connate in some flowers than in others. Fig. 337 shows the outer coronalobes fully intergrown, as in *Caralluma*. Fig. 336 seems to embody a considerable variation in the form and color of the whole

flower. Dr. Brown wrote of the species in the Flora Capensis: "This remarkable plant does not quite agree with *Stapelia* or any other genus in structure. The corona seems to be a combination of that of *Caralluma* and *Piранthus*, whilst the corolla resembles somewhat that of *Stapelia woodii* and its allies with an annulus added."

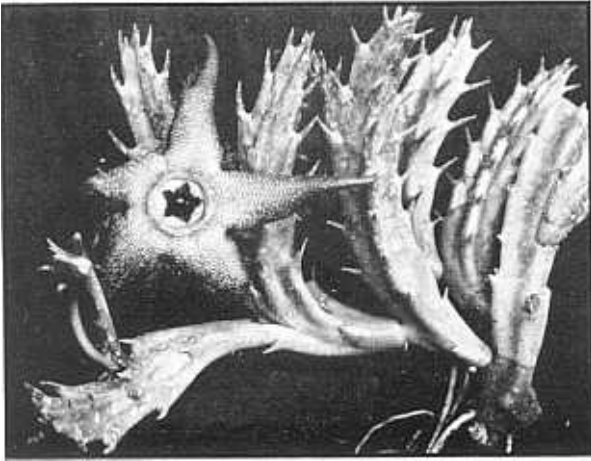


FIG. 338

Stultitia hybrid ?

Photo by S. Tapscott, who writes: "This was one of my seedlings, different from any plant I have seen, though in some ways resembling *Stultitia cooperi* and *Stapelia gettleffii*. A peculiar thing is that I raised some seeds from a pod off this plant and they all came true. The seedlings could not be distinguished from the parent."

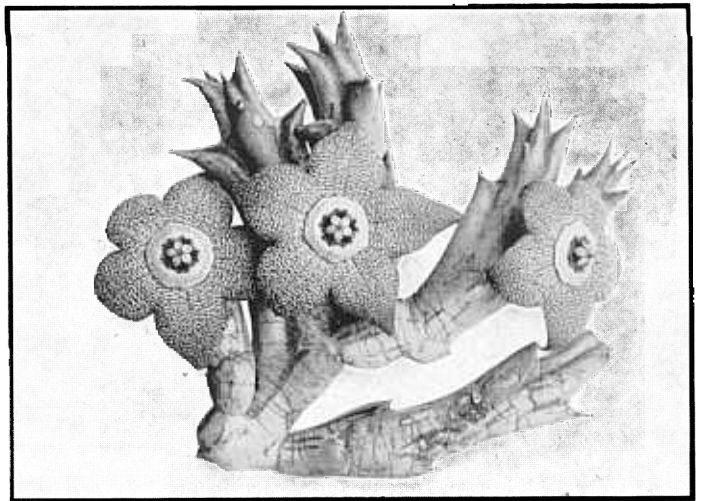


FIG. 339

Stultitia cooperi Phillips x 1.

From the collection of Mrs. W. Armstrong van Ryneveld, Somerset East.
Photo: G. W. Reynolds,
Johannesburg.

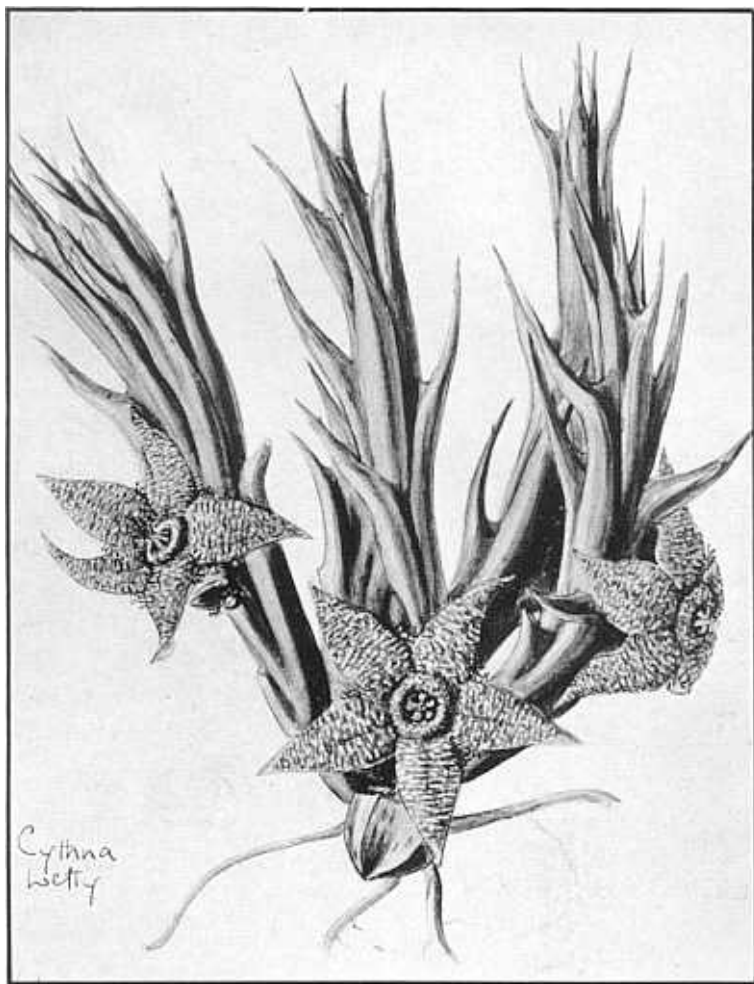


FIG. 340

Stultitia tapscottii Phillips x 0.85

From the original water color drawing by Miss Cythna Letty for the Flowering Plants of South Africa, 1933.

2. *Stultitia tapscottii* (Verdoorn) Phillips, Flow. Pl. So. Afr., t. 520. 1933.

Stapelia tapscottii Verdoorn, Kew Bull., 357. 1927.

(Description by Dr. E. P. Phillips, l.c.):

Plant: up to 12 cm. high; *stems* branched, with long conical teeth up to 2 cm. long, glabrous; each tooth bearing 2 minute lateral teeth;

Flowers: in groups of 3 or 4;

Pedicel: 0.5 to 1.2 cm. long, glabrous;

Sepals: 7 mm. long, lanceolate, acute;

Corolla: in bud subglobose; when fully expanded 5 cm. in diameter, reddish with raised white markings; *disk* with a slightly raised *annulus* 1 cm. in diameter; *lobes* 2 cm. long, 1.1 cm. broad at the base, ovate, subacuminate, with a few scattered vibratile clavate hairs;

Outer corona: basin-shaped; lobes almost oblong, bifid;

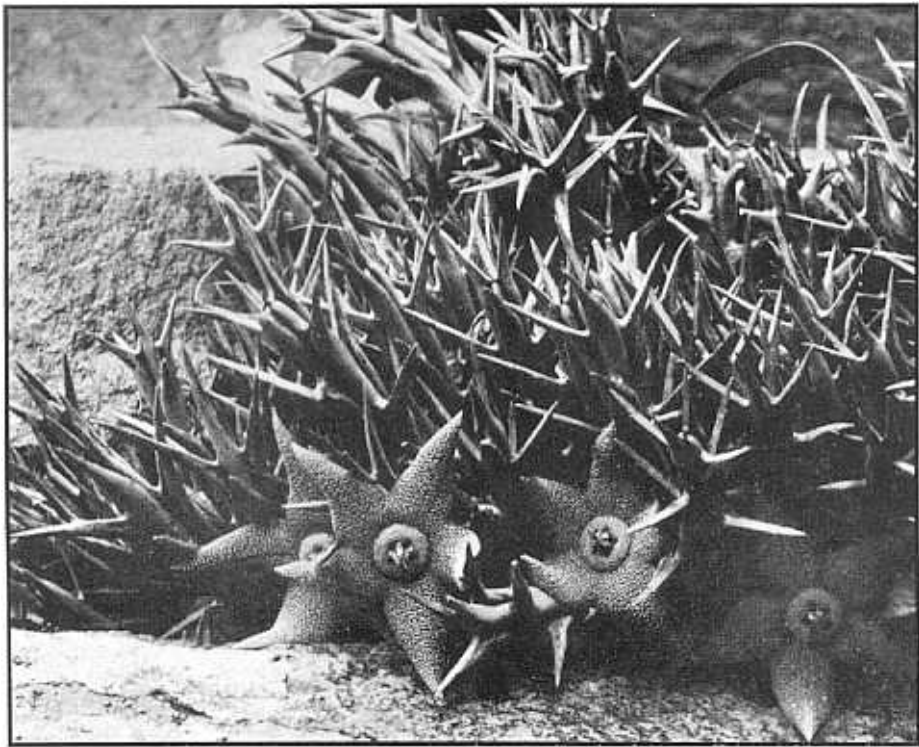


FIG. 341. *Stultitia tapscottii* Phillips x 0.9. Photo by S. Tapscott.

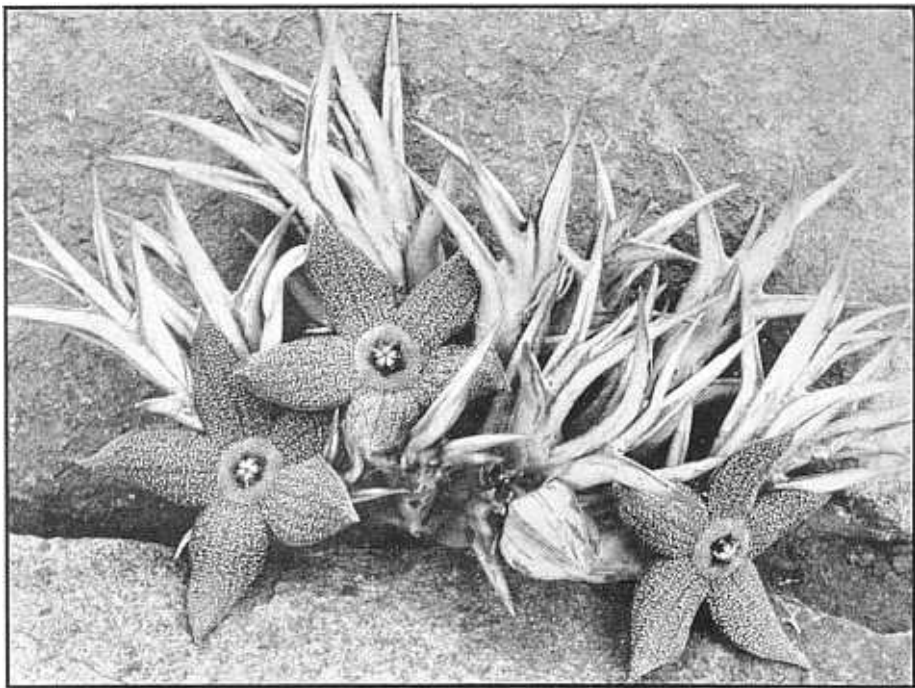


FIG. 342. *Stultitia tapscottii* Phillips x 0.9. Photo by S. Tapscott.

Inner corona: lobes produced into long subulate processes, subclavate at the apex, broadened at the base, with a small dorsal hump at the base of the broadened portion.

Type locality: Bechuanaland Protectorate: Lobatsi.

Distribution: Also in Bechuanaland Protectorate: Molepolole; Mochudi; Kalahari Desert; Transvaal: Pietersburg Distr.: Bochum; Blaauwberg; and other points; Lydenburg Distr.: Sekukuniland; Waterval Valley; Cape Prov.: Griqualand West: Kimberley Distr.



FIG. 343

Stultitia tapscottii Phillips x 1.
From the collection of David Pringle.

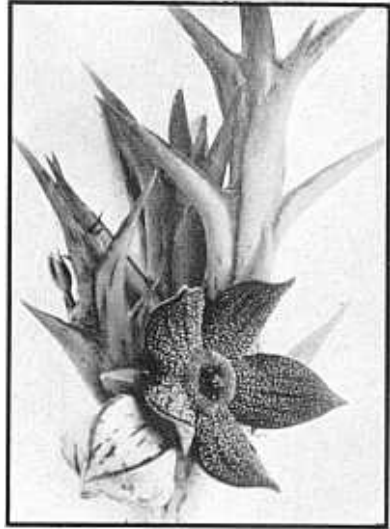


FIG. 344

Stultitia tapscottii Phillips x 1.
Photo by S. Tapscott.



FIG. 345

Seed pods of *Stultitia tapscottii* Phillips
Photo by S. Tapscott.

"Tapscott's *Stultitia*" was discovered by S. Tapscott near Lobatsi, in the south-east corner of the Bechuanaland Protectorate, about 1927. It has been collected at a number of stations in the Bechuanaland Protectorate, Griqualand West and the Transvaal, as far north as the tropic above Pietersburg. According to our collaborator, Mr. Reynolds, it grows "sometimes under low thorn bushes, but mostly in raised exposed positions between bushes, generally in fine red sand. The clumps vary from about 6 inches across, or 10 to 20 stems, to 18 inches or more, with 60 or

more stems. It is very plentiful near Buf-felsvlei, Transvaal, where I found several dozen clumps of all sizes dotted about the veld within the space of a dozen yards." The species is closely related to *Stultitia cooperi*. The stems resemble those of the companion species and have similar minute denticles at the sides of the teeth, but the teeth themselves are much more ferocious and on some stems they are nearly an inch long.

The flowers have a reddish corolla with raised whitish markings; the lobes are fringed near the base with a few vibratile clavate hairs. The principal structural difference from *S. cooperi* consists in the shape of the inner corona-lobes, which are produced into long subulate processes above the anthers, with clavate tips somewhat arching-divergent. They have a small dorsal hump at the base. The outer corona is bowl-shaped with bifid lobes.

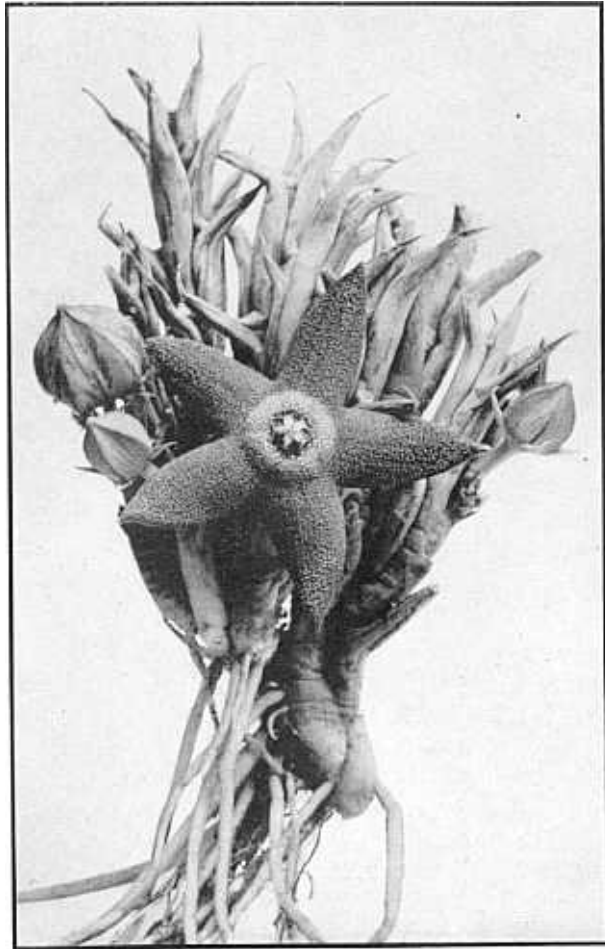


FIG. 346

Stultitia tapscottii Phillips x 1.

Photo: G. W. Reynolds, Johannesburg.

DRAKEBROCKMANIA, gen. nov.

Genus proponitur novum ad *Carallumam crassam* (N. E. Brown) e Somalia Britannica accomodandam. *Drakebrockmania* corona interiora longe stipitata gaudet, qua nota a *Caralluma* et a *Stapelia* abhorret. Caules speciei typicae uniusque adhuc notae habitu praesucculento, angulis crenato-dentatis a caeteris speciebus STAPELIEARUM differunt.

We have erected the genus *Drakebrockmania* upon the single species, *D. crassa* (N. E. Brown), from British Somaliland. The genus differs from other genera of the STAPELIEAE in its whole coronal form, and more particularly in the stipitate structure of the inner corona. The single species was included under *Caralluma* by Dr. N. E. Brown, but it is separated from that genus by the fact that the outer corona-lobes are not intergrown with the inner corona-lobes. Moreover *Drakebrockmania* cannot be united to *Stapelia*, which it resembles in its nearly free outer corona-lobes, because the inner corona, instead of forming directly as separate lobes, rises from its base to about half-way up in a united columnar stalk. It then divides and the five lobes branch off at an angle of about 60° from the horizontal; presently, broadening somewhat, they bend inward horizontally to meet at a common centre, the tips connivent in a minute nipple-like point. As a whole, the inner corona resembles a little inverted cone, balanced on the summit of

a slender column.

The plant stems of *Drakebrockmania* are grotesquely thick and unlike other Stapeliads, and, when Dr. Brown first wrote us about *Drakebrockmania* (*Caralluma*) *crassa* in 1933, he emphasized their odd appearance. "You express curiosity," he wrote, "about *Caralluma crassa*. This is a very thick-stemmed species, which was figured and described for the Botanical Magazine, but never published. Its flowers are insignificant, but its stem is remarkably thick." We dedicate the genus to Col. Ralph Evelyn Drake-Brockman, a gallant officer in the British Medical and Ambulance services and the discoverer of two other East African Stapeliads besides *Drakebrockmania crassa*.

In the enlarged cross-section of the flower, which appears twice in Fig. 347, the entire corona can be readily seen, the narrow forking lobes of the outer corona as well as the unique inner corona, against the hairy background of the corolla-tube.

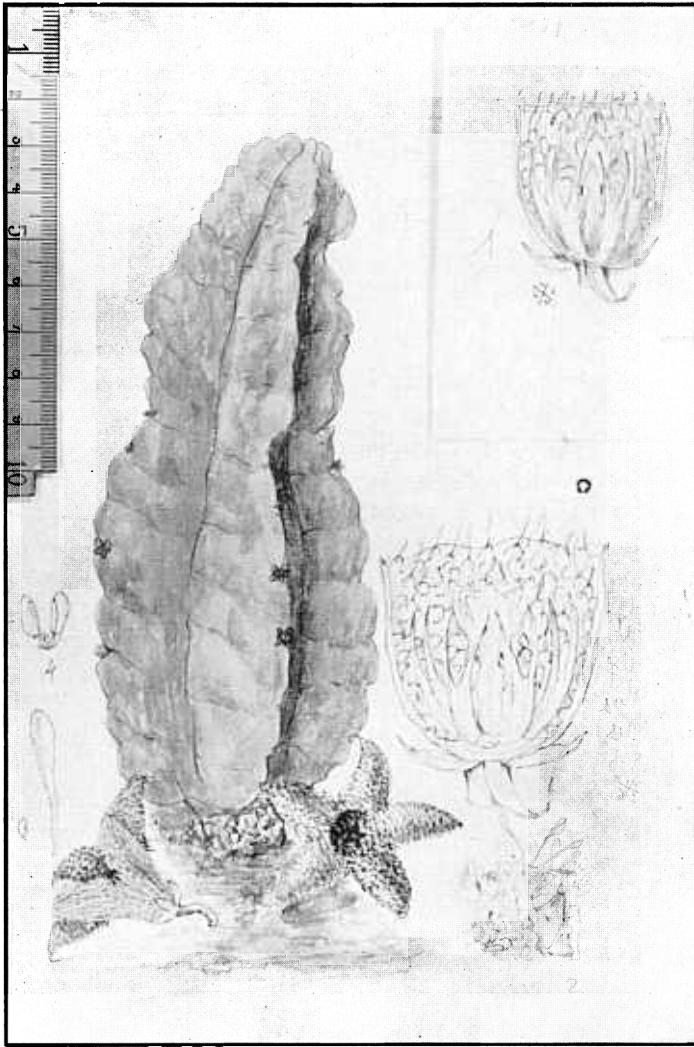


FIG. 347

Drakebrockmania crassa, comb. nov.

Drawing by Miss Matilda Smith. Reproduced by permission of the Bentham Trustees.

Drakebrockmania crassa* (N. E. Brown), comb. nov.Caralluma crassa* N. E. Brown, Gard. Chron., xcvi. 6. 1935.

(Description by Dr. Brown, l.c.):

Herb: succulent; *stems* erect, 4-angled, 4 to 6 in. high, $1\frac{1}{4}$ to $1\frac{1}{2}$ in. square, with acute crenate-dentate angles, glabrous, light green, slightly glaucous;

Flowers: developed from the young shoots, solitary or perhaps appearing in succession;

Pedicel: about $\frac{1}{3}$ in. long;

Sepals: $\frac{1}{6}$ to $\frac{1}{5}$ in. long, lanceolate, acute, glabrous;

Corolla: about $1\frac{3}{4}$ in. in diameter, glabrous, smooth and whitish green spotted with purplish on the outer surface; rugose and light yellow dotted with dark red on the inner surface, bearded with simple hairs in the throat of the tube and fringed with a small tuft of vibratile clavate dark purple hairs in the angle between the lobes; *tube* campanulate, about $\frac{1}{2}$ in. long and as much in diameter; *lobes* recurved-spreading about $\frac{2}{3}$ in. long, $\frac{2}{5}$ in. broad, ovate or ovate-lanceolate, acute, more or less convex on the inner surface;

Outer corona: lobes arising at the base of the staminal column, suberect and rising to nearly the same height as the inner corona, broadly linear, divided to their middle into two slightly divergent subulate acute teeth;

Inner corona: stipitate, slightly overtopping the outer corona, apparently dark purple-brown, its five lobes dilated upwards, forming an obconic structure, corrugated at its flattish top, with the tips of the lobes connivent into a minute nipple-like point at the centre.

Type locality: British Somaliland: Odweina.

Distribution: Not further known.

The "stout Drakebrockmania" is a unique Stapeliad, discovered by Col. Ralph Evelyn Drake-Brockman near Odweina, 40 miles west of Burao, British Somaliland, and sent by him to Kew in 1914. It flowered in August, 1919, when Dr. Brown drew up the description. The flowers, with their large campanulate corolla-tube, recall those of *Caralluma speciosa* in size as well as in shape, but they grow singly or in succession, and not in terminal umbels. Their unique character is found in the stipitate inner corona. Around this strange inner corona arise the lobes of the outer corona, not as tall, but free nearly from the base

and forked about half-way up in two long subulate acute tines, which curve in towards the inner corona. The entire corona sits comfortably within the corolla-tube, protected from undesirable insects by the beard of simple hairs at the throat of the tube. The corolla is rugose throughout its inner surface, light yellow with dark red dots, and ciliate at the sinuses between the lobes with small tufts of vibratile clavate hairs. The species gets its name from its very thick stems, the angles without pointed teeth, but in their stead with a characteristic wave-like edge.

EDITHCOLEA N. E. Brown, Kew Bull., 220. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 492):

Plants: succulent perennial leafless herbs, more or less branched; *branches* fleshy, spine-toothed at the angles;

Flowers: from near the apex of the branches, pedicellate, very large;

Calyx: 5-partite;

Corolla: large, rotate or saucer-shaped, 5-lobed half-way to the centre; *tube* hemispherical, exceedingly small in proportion to the limb; *lobes* valvate in bud;

Corona: small, double, arising from the staminal column;

Outer corona: of 5 short ascending or somewhat pouch-like lobes, alternating with the anthers, with their margins shortly adnate to the inner corona-lobes;

Inner corona: of 5 erect fleshy lobes, dilated at the apical part and inflexed over the anthers, with contiguous margins, densely echinulate or tuberculate on the back;

Staminal column: arising near the bottom of the corolla-tube, very small; *anthers* erect or slightly incurved at the tips, oblong, unappendaged; *pollen-masses* erect, compressed elongate-ovoid, pellucid at the apex, solitary in each anther-cell, large in proportion to the corona, attached in pairs to the blackish pollen-carriers by very short broad caudicles; *style* not exceeding the anthers, somewhat compressed-truncate at the apex, something like the roof of a house, with the two angles very shortly produced or bicornulate.

Type species: *Edithcolea grandis*.

Total species: 2.

Distribution: Socotra, British Somaliland, Kenya, Tanganyika.

A tropical genus, named for Miss Edith Cole, who discovered *Edithcolea grandis* in British Somaliland about 1895. The genus differs from *Caralluma* technically in the form of the inner corona, and the large flowers are also quite different in general appearance from those of any *Caralluma*. The upper half of each inner corona-lobe is bent almost horizontally over the anthers and is dilated so that its margins touch the margins of the adjacent lobes all the way from the bend to the tip, the entire inner corona forming a structure like a diminutive summer-house with a tiny tight pentagonal roof. The inner corona-lobes are curiously spiny or tuberculate on the exterior top surface, and thereby differ from those of the most nearly related species of *Caralluma*, *C. anemoniflora*, whose

somewhat similarly shaped inner corona is entirely without any such echinulations. The outer corona of the *Edithcoleas* is formed of short ascending pouch-like lobes and is wholly in the *Caralluma* tradition. The corolla of the *Edithcolea* flowers is flattish or saucer-shaped, with a singularly small rounded tube at the centre containing the corona. The hairs on the inner corolla face are very remarkable. Five bands of clavate hairs radiate from the centre across the disk to the sinuses between the lobes, then divide to form borders along the basal half of the lobes and finally cross the otherwise glabrous lobes near their middle point in broad arcs. Unfortunately neither member of this curious genus has as yet been successfully introduced into cultivation in Europe or America.

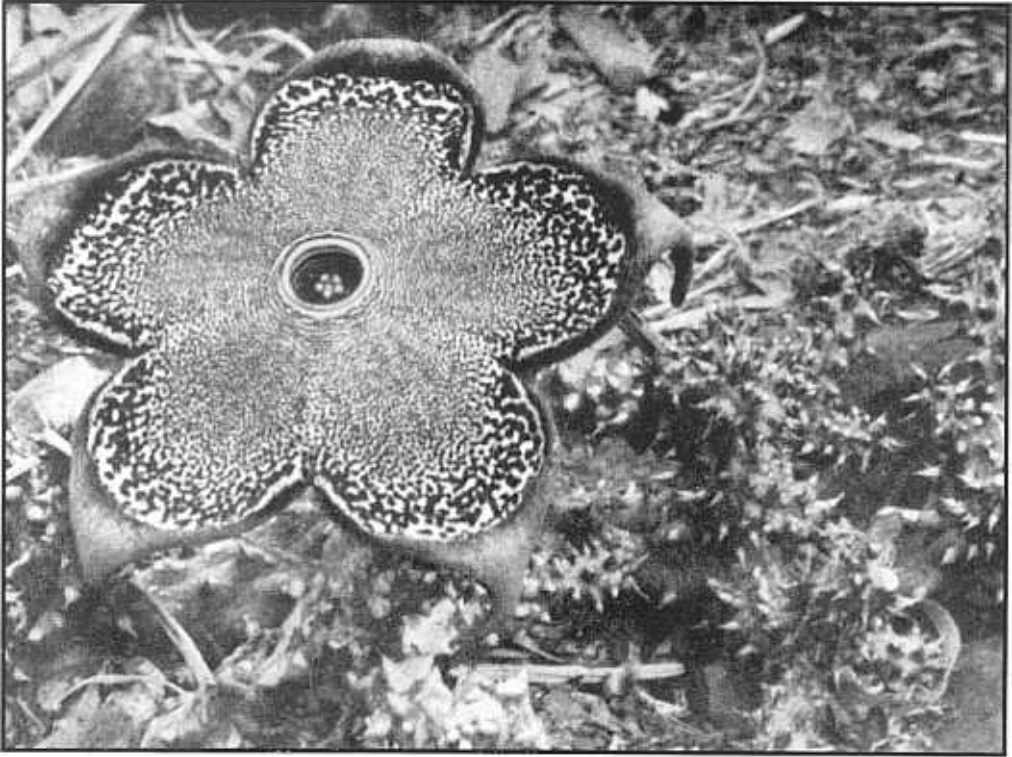


FIG. 348

Edithcolea grandis N. E. Brown x 1.

From Donyo Sabuk, Kenya. Photo by Dr. A. J. Jex-Blake.

1. *Edithcolea grandis* N. E. Brown, Kew Bull., 220. 1895.

(Description by Dr. Brown, Flora Trop. Afr., iv. i. 492):

Stems: succulent, "growing to about a foot in height and 1 in. or more in diameter, decumbent at the base" (*Miss Edith Cole*), 5-angled, glabrous; angles armed with hard brown very acute spine-like teeth;

Flowers: subsolitary at the tips of the branches;

Pedice: 7 to 9 lin. long, $1\frac{1}{4}$ to $1\frac{1}{2}$ lin. thick, glabrous;

Sepals: 4 lin. long, 1 to $1\frac{1}{4}$ lin. broad, ovate-lanceolate, acuminate, probably recurved at the somewhat indurated pungent tips;

Corolla: 4 to 5 in. or perhaps more in diameter, 5-lobed half-way to the centre, rotate or saucer-shaped, glabrous on the back; *tube* about $\frac{1}{4}$ in. in diameter and $1\frac{1}{2}$ to 2 lin. deep, with a slightly elevated acute rim around its mouth, glabrous; *disk* rugose with concentric ridges and furnished with 5 lines of long clavate purple hairs radiating from the centre to the sinuses, otherwise glabrous, apparently whitish or pale yellowish marked with dark purple-brown spots, which at the middle (or base?) of each lobe are confluent in an arc; *lobes* $1\frac{1}{2}$ to 2 in. long, 1 to $1\frac{1}{4}$ in. broad, ovate, acute, bordered with long clavate purple hairs to about the middle, where the borders incurve and form a broad hairy arc across each of the lobes, which are otherwise glabrous, and from the inner margin of the hairy arc to the apex are dark purple-brown without markings;

Outer corona: lobes $\frac{1}{3}$ to $\frac{1}{2}$ lin. long, subquadrate or transversely oblong, acutely bifid, with a broad shallow sinus between the points, concave and hairy within;

Inner corona: lobes $\frac{3}{4}$ to 1 lin. long, erect, fleshy, gibbous at the base, broadly linear at the middle; triangularly dilated at the tips, which are inflexed over the anthers, with contiguous margins and minutely echinulate on the back, keeled on the inner face, glabrous;

Pollen-masses: nearly $\frac{1}{4}$ lin. long; *pollen-carrier* narrow, rather more than half as long as the pollen-masses.

Type locality: British Somaliland: Henweina Valley, about 3000 ft. elevation.

Distribution: Also in rocky places by the Riva Dana; Kenya: common in the Wakamba country, below Donyo Sabuk hill; Tanganyika: near Tanga.

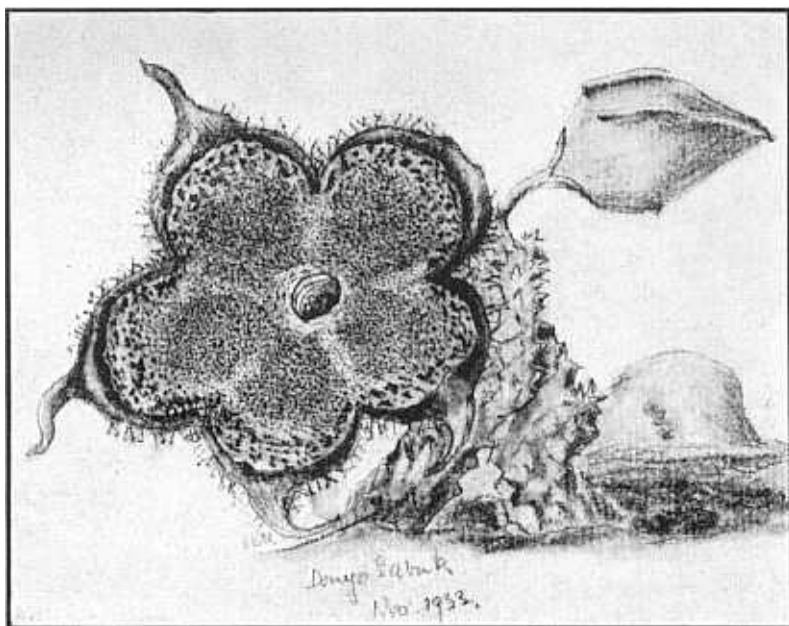


FIG. 349

Edithcolea grandis
N. E. Brown x 0.75

From Donyo Sabuk,
Kenya. Drawing by
Mrs. E. R. Molony.

"This," wrote Dr. Brown, "is one of the handsomest and most distinct of all the Stapelioid group." It was discovered by Miss Edith Cole about 1895 and has been collected by several other botanists in British Somaliland and it extends south into Tanganyika. The flowers, as the specific name implies, are very large, 4 to 5 inches in diameter or perhaps more, the base yellow spotted with brown, the upper part of the lobes uniformly dark purple-brown. In flowers collected in Kenya the tips of the lobes, which eventually curl up and are hidden under the flower, are shaded off to an

olive-green. The bands of long clavate purple hairs radiating from the centre to the sinuses, bordering the base of the lobes and crossing them in a broad hairy arc at the middle, are very prominent. "It is a most beautiful flower," Lady Muriel Jex-Blake writes us, "the reflexed tips of the corolla-lobes making it like a Tudor Rose in shape, and the color is more like a beautifully toned Persian carpet than anything else—really lovely." Certainly the species is one of the choicest prizes still remaining for the Stapelia fanciers successfully to introduce and grow in their collections.

2. *Edithcolea sordida* N. E. Brown, Forbes: Nat. Hist. of Sokotra, 486. 1903.

(Description by Dr. Brown, l.c., translated from the Latin):

Pedice: $1\frac{1}{2}$ in. long, fleshy, glabrous;

Sepals: $2\frac{1}{2}$ to 3 lin. long, $1\frac{1}{2}$ to $1\frac{3}{4}$ lin. broad, ovate, acuminate, recurved at the apex, glabrous;

Corolla: large, $3\frac{1}{2}$ in. in diameter in the dried state; outside glabrous, smooth; inside tuberculate-rugose, dark purple, covered with clavate purple hairs along the margins and near the apex of the lobes and in five bands radiating from the centre to the sinuses of the lobes; *tube* small, about $1\frac{1}{2}$ lin. deep and 3 lin. in diameter; *limb* very large, lobed more than half-way down; *disk* or united portion probably plate-shaped; *lobes* when dried $1\frac{1}{4}$ in. long, 7 to 8 lin. broad, oblong-lanceolate, acute, recurved at the apex;

Outer corona: lobes hardly $\frac{1}{2}$ lin. long, acutely bifid, pouch-shaped, hairy on inner face;

Inner corona: lobes $\frac{3}{4}$ lin. long, at the base linear erect, at the apex triangular-dilate, incumbent on the anthers, tuberculate.

Type locality: Socotra: the Garieh Plain.

Distribution: Also recorded from Jena-agahan; and probably near Hadibu.

The "shabby *Edithcolea*" was collected by the expedition of Dr. H. O. Forbes and Ogilvie-Grant to the island of Socotra in 1898-99. It differs from *Edithcolea grandis* by the smaller flowers, the dark purple color, the more oblong lobes of the corolla, which is densely tuberculate-rugose, instead of having concentric raised ridges. The bands of hair on the face of the corolla and the corona form typical of the genus reappear as in *E. grandis*. The plant was found growing in considerable abundance on the low granite hills in the Garieh Plain and also around the expedition's camp at Jena-agahan. Dr. Forbes wrote of it: "Our Somali boys said they knew it well in the

hills of their own country (referring probably to *E. grandis*), where they chewed the leaves. Those of the Socotran plant were, however, they said, more bitter than their own plant. The Socotri name is "*Mush-harmohum*." According to Berger the plant is probably the same as one collected by Prof. Schweinfurth on April 3, 1881, on the chalk hills near Hadibu, the capital of the island. Hadibu is picturesquely situated at the head of the bay of Tamarida on a semicircular plain enclosed by the foothills of the Haghier Mountains, and it is presumably on these that Schweinfurth's plant grew.

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